THE physical therapy REVIEW

Physical Therapy Technics for Bulbar Poliomyelitis — ROBINS, ADKINS, LINQUIST, LIM, and DAIL

Treatment of Whiplash Injury — ALVORD

Physical Therapy Applied to Leprosy Cases — ARNON

Physical Therapy in Industry — AKERSTROM

Case Reports — KNOTT

Suggestions from the Field — NELSON

Annual Statistical Reports

Volume 38, Number 8 **August, 1958**

PUBLISHED MONTHLY BY

AMERICAN PHYSICAL THERAPY ASSOCIATION

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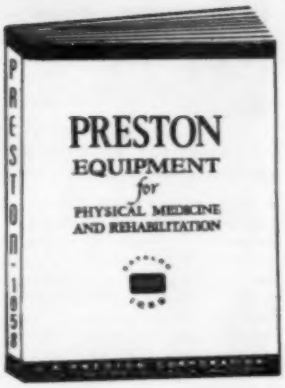

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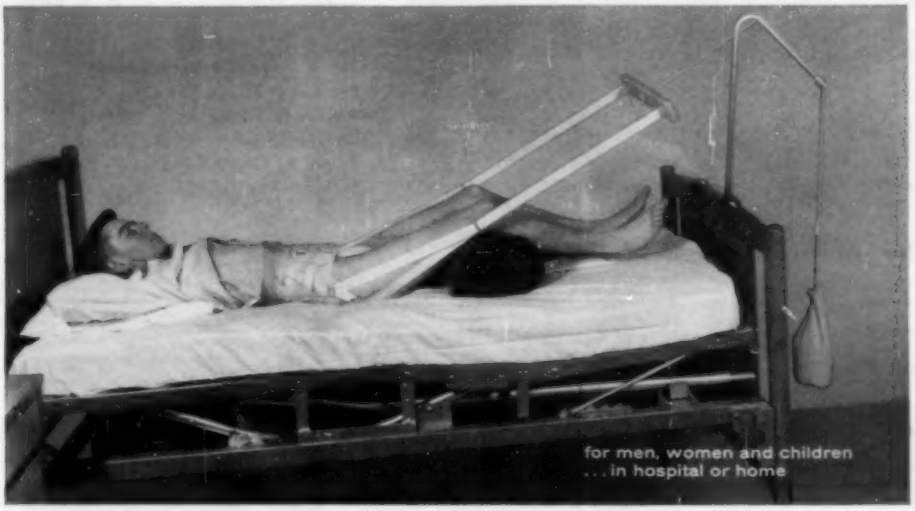

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August, 1958
Vol. 38 No. 8

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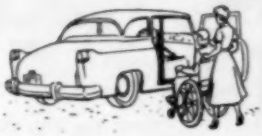

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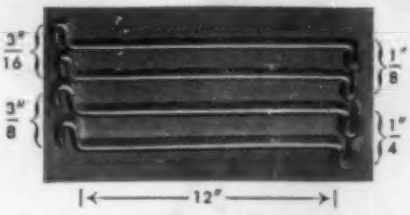

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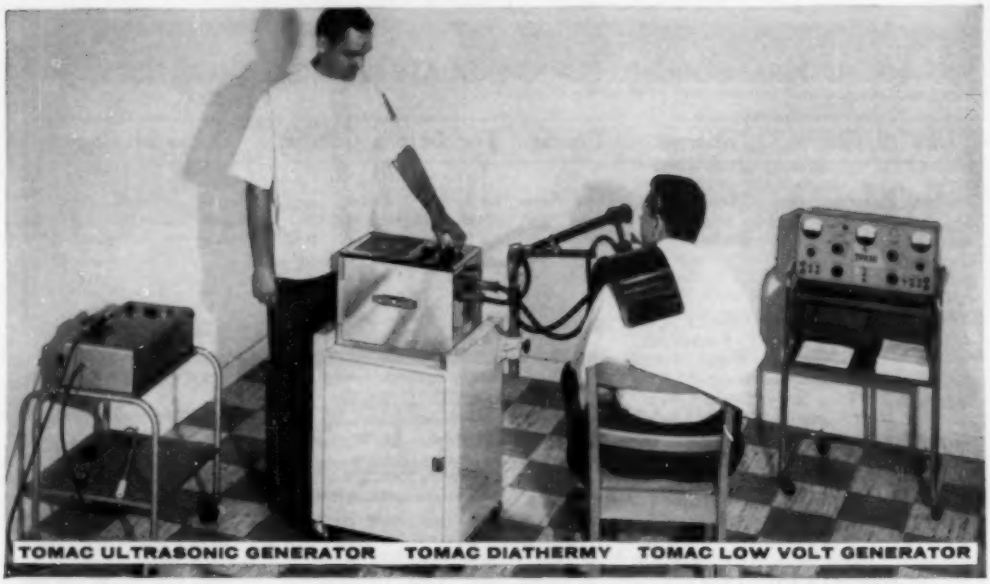

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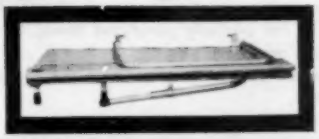

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Physical Therapy Technics for Bulbar Poliomyelitis

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In recent years, the mortality rate of patients with acute bulbar poliomyelitis has been greatly decreased by improved medical care and knowledge of the treatment of this disease. As a result, many of these patients have been seen in the convalescent phase with residual paralysis and weakness of the muscles supplied by the cranial nerves. A concentrated treatment program aimed at aiding the restoration of function in these muscles was begun in March, 1954, at the Respiratory Center for Poliomyelitis, Rancho Los Amigos Hospital. Many physical therapists throughout this country as well as in foreign countries have expressed an interest in the program. Therefore, it is the intent of this article to describe the treatment of the bulbar poliomyelitic patient, and at the same time to answer some of the questions presented by other therapists wishing to become acquainted with the technics used.

It was observed that inactivity of the jaw and throat due to paralysis and weakness predisposed tightness in these structures similar to that found in the extremities with spinal poliomyelitis. It appeared logical then, that the treatment should be basically the same as that used with spinal poliomyelitis. The following are the basic steps in the treatment program and represent the plan of presentation of this article:

1. Testing to determine areas and extent of involvement
2. Proper positioning to prevent deformity
3. Stretching to maintain range of motion
4. Exercises to increase strength, coordination and function
5. Follow-up care

As an aid in orientation to the bulbar structures, table 1 lists the muscles, muscle actions and nerve supply of the jaw, throat, and eye. The neck flexors and extensors and the muscles of the face will not be included in this list, or in the evaluation and treatment technics which follow, as most physical therapists are thoroughly familiar with paralyses of these structures.

Testing to Determine Areas and Extent of Involvement

To determine tightness and tenderness in muscles of:

1. *Jaw opening*
   For free jaw opening range the patient

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should be able to place his three middle fingers on a sagittal plane between his teeth. Ask the patient to indicate area of pain on any of the jaw motions.

2. *Jaw closing*
Have the patient approximate the front teeth, then the back teeth. Palpate the masseter and temporalis for tenderness. Observe areas of atrophy around the temples or jaw. Again ask for indication of pain on motion.
3. *Jaw deviation*
Observe the midline position of the lower jaw at rest. Stabilize the head with one hand, with the other grasp the mandible firmly and assist the patient in lateral movement of the jaw. Observe for asymmetry of range.
4. *Jaw retraction*
Using a piece of gauze, place the first finger inside the lower teeth and the thumb underneath the mandible, pull forward as patient attempts to protrude his jaw. Stabilize the head by holding against the forehead. Observe the extent of range.
5. *Tongue*
Observe the tongue at rest. Have the patient do protrusion and lateral deviation, and observe extent of range, asymmetry of motion, and flattened, shortened or wrinkled areas in the tongue. Palpate for tenderness in the muscles of the floor of the mouth.
6. *Hyoid structures*
Use the thumb and index finger to grasp the hyoid bone. Stabilize the mandible with the other hand. Gently move the hyoid bone up, down, and laterally. Observe asymmetry of range. Palpate for tenderness of the muscles of the throat and neck. Tongue motions may be used to detect tightness in the hyoid structures.
7. *Thyroid and cricoid structures*
Grasp the hyoid bone as in figure 1 with one hand and the thyroid cartilage with the other hand. Stabilize the hyoid bone and move the thyroid cartilage down and laterally. Observe the degree at which the cartilage is fixed to the hyoid bone. Use the fingers of one hand to move the thyroid and cricoid cartilages laterally while stabilizing the hyoid bone with the other hand. Observe asymmetry of range.

To determine function and strength of:

1. *Eyelid*
   a) Observe ptosis indicating weakness of the levator palpebrae superioris.
   b) Have patient attempt opening the lids against therapist's finger tip on upper lid.
   c) Observe if lids open as eyeball moves up.
   d) Have the patient close the lids tightly to test the function of the orbicularis oculi. Observe for asymmetry. Feel with the finger tips for the rapid vibration that is present in the lids normally. Resistance may be applied by pulling the eyelids apart with the fingers. If there is weakness the lids open readily and lid vibration is diminished.
2. *Eyeball*
   a) Have the patient follow a small rounded object with the eyes as it is moved up and down. For synergistic action of muscles performing this motion refer to table 1.
   b) Have the patient follow the object from side to side with the eyes to test the function of the recti medialis and lateralis. In looking to the right, the right lateralis and the left medialis work together. If the object is held in the center and close to the patient's face the two recti medialis must work together to focus on the object.
   c) Rotary movements are done by action of the four recti combined. In unilateral testing, if two neighboring recti of one eye act together they carry the eyeball upward and medialward, upward and lateralward, downward and medialward, and downward and lateralward.
3. *Jaw*
   a) Have the patient open the jaw as widely as possible. This motion is performed by the external pterygoideus. Resistance may be given by pushing up on the mandible after the patient has completed the full range of opening. Observe for deviation on opening. In unilateral involvement the jaw deviates to the weak side. The digastricus, mylohyoideus, and geniohyoideus assist in opening the jaw. Normal power in jaw opening is very difficult to break.
   b) Test the patient's ability to close the jaw by using a tongue blade and asking the patient to bite. Grant states that "When the teeth of the lower jaw close on the upper teeth a force ranging from 150 to 300 pounds can be exerted."[2]

Move the tongue blade to different parts of the jaw and resist by trying to pull the tongue blade from the clenched teeth. Closing may also be resisted by using several tongue blades taped together to exert a downward force on the mandible as the patient holds the tongue blades with the teeth. Palpate for the function of the temporalis and masseter. The internal pterygoideus is deep, and therefore is not easily palpated. Ask the patient if he has difficulty chewing, especially meats. Observe for deviation in closing. In unilateral involvement the jaw deviates to the strong side.

c) Have the patient protrude the jaw. Observe for asymmetry. The jaw deviates to the weak side in unilateral involvement. Resistance may be applied against the front of the mandible. Protrusion of the jaw by the pterygoideus externus is accompanied by synergistic action of the closing muscles which prevent the rotation of the mandible that occurs at the temporomandibular joint to open the jaws widely.[3] Deviation may be tested by having the patient move the mandible from side to side. Apply resistance laterally to the mandible after the completion of each movement.

4. *Tongue*

a) Observe tongue for atrophy.

b) Have the patient protrude the tongue to test the action of the genioglossus, geniohyoideus, and transversus. In unilateral involvement the tongue deviates to the weak side. Resist protrusion with a tongue blade against the tip of the tongue.

c) Have the patient protrude the tongue and move it from one side to the other. Resist after each motion just lateral to the tip of tongue.

d) Have the patient flatten the tongue in the floor of the mouth. Resist with a tongue blade under the tongue. Depression is a function of the hyoglossus, verticalis and longitudinalis inferior.

e) Resist upward motion at different places on the dorsum of the tongue to test for function of the longitudinalis superior, styloglossus, and mylohyoideus.

f) Grasp the sides of the tongue with a piece of gauze. Have the patient pull the tongue back into the mouth. Resist after completion of the motion by pulling forward. Retraction of the tongue is done by the combined action of longitudinalis superior and inferior, anterior fibers of the genioglossus and the styloglossus.

Figure 1. Technic used to determine tightness in the infrahyoid structures.

g) Have the patient attempt different shapes of the tongue as forming a channel, curling the tip and sides up or down, etc. Also have the patient move the tongue around inside the mouth.

h) Listen for difficulty in enunciation especially of the consonants.

5. *Soft palate*

a) Observe the velum and arches of the soft palate at rest, during phonation of high "ah," and during the gag reflex. Normally the soft palate is elevated during phonation and gagging by action of the levator veli palatini. In unilateral involvement the velum is pulled to the strong side. In bilateral involvement, elevation of the velum varies from diminished to absent.

b) To test for closure of nasopharynx, have the patient inflate the cheeks. This inflation is only possible if the nose is closed off. Have the patient blow forcibly through pursed lips as if blowing a candle out. Check for escape of air from nose by holding a feather or a mirror under the nostrils. If there is facial weakness and the patient is unable to close the mouth adequately, he can put his mouth against his hand or arm during puffing. Listen for nasal speech. Check for regurgitation of fluids. Have the patient make a continuous vowel

sound while the therapist alternately opens and occludes the nostrils. Normally there should be no increase in nasality.

6. *Posterior pharyngeal wall*

a) Have the patient say "ah" and observe the posterior pharyngeal wall for the contraction of the superior pharyngeal constrictor. Normally, during strong phonation the wall is widened and elevated. When weakness or paralysis is present there is diminished contraction or loss of motion.

b) Stimulate the gag reflex with an applicator. In unilateral involvement, stroking of the affected side of the wall will reveal a diminished or absent gag reflex. In bilateral involvement the response will

TABLE 1. Muscles Supplied by the Cranial Nerves [1, 2, 3, 4]

	Muscles	Bony and Soft Tissue Attachments		Nerve Supply		Muscle Actions
		From	*To*			
Eyeball	Obliquus Occuli Superior	Bones of optic Foramen	Sclera		IV	Together the superior and inferior rotate the eyeball up and down with lateral rotation.
	" " Inferior	Maxilla	Sclera		III	The superior oblique and inferior rectus act together on looking directly downwards, each ruling out the rotation of the other. The same is true of the inferior oblique and superior rectus on purely upward direction of the pupil.
	Rectis Medialis Lateralis Inferior	Optic Foramen by fibrous ring	Sclera	Med. Sup. Inf.	III	Recti Sup. and Inf. rotate eyeball up and down with medial rotation.
	Superior			Lat.	VI	Lat. and Med. move eyeball horizontally with no rotation.
Eyelid	Levator Palpebrae	Sphenoid	Skin of eyelid Sup. Tarsus Sup. Fornix of conjunctiva		III	Raises eyelid
	Orbicularis Oculi	Frontal bone Maxilla	Sup. and Inf. tarsi		VII	Closes eyelid
Jaw	Digastricus	Temporal Mandible	Hyoid bone	Ant. Belly Post. Belly	V VII	Assists in opening jaws
	Masseter	Maxilla	Mandible		V	Closes jaws
	Pterygoideus Externus	Sphenoid	Mandible		V	Opens jaws, protrudes mandible, and moves it from side to side.
	Pterygoideus Internus	Sphenoid Palatine Maxilla	Mandible		V	Closes jaws
	Temporalis	Temporal	Mandible		V	Closes jaws

TABLE 1. Muscles Supplied by the Cranial Nerves [1, 2, 3, 4] (*continued*)

	Muscles	Bony and Soft Tissue Attachments		Nerve Supply	Muscle Actions
		From	*To*		
Neck	*Infrahyoid Muscles*				
	Sternohyoideus	Clavicle Manubrium sterni	Hyoid	XII	Draws hyoid bone downward
	Sternothyroideus	Manubrium sterni 1st rib	Thyroid	XII	Draws thyroid cartilage downward
	Thyrohyoideus	Thyroid Cartilage	Hyoid	XII	Draws hyoid bone downward
	Omohyoideus	Scapula	Hyoid	XII	Draws hyoid bone downward
	Suprahyoid Muscles				
	Digastricus	See jaw muscles			
	Geniohyoideus	Mandible	Hyoid	XII	Draws hyoid bone and tongue forward
	Mylohyoideus	Mandible	Hyoid	V	Raises hyoid bone and tongue
	Stylohyoideus	Temporal	Hyoid	VII	Draws hyoid bone upward and backward
Palate	Glossopalatinus	Soft palate	Tongue	XI	Deglutition
	Levator Veli Palatini	Temporal Cartilage of auditory tube	Velum of Palate	XI	Elevates soft palate
	Musculus Uvula	Palatine	Uvula	XI	Fills up interval between pharyngopalatine arches during swallowing, pulls uvula up.
	Pharyngopalatinus	Soft Palate	Pharynx Thyroid cart.	XI	Pulls pharynx up and over bolus during swallowing.
	Tensor Veli Palatini	Sphenoid Auditory tube	Palatine	V	Opens eustachian tube during swallowing, yawning and sneezing. Renders ant. port. of soft palate tense.
Pharynx	*Constrictors*				
	Superior	Sphenoid Mandible Tongue	Occipital bone Posterior median raphe	IX, X and Sympathetic	Conveys food into esophagus
	Medialis	Hyoid			
	Inferior	Cricoid cartilage			
	Stylopharyngis	Temporal	Thyroid cartilage and Pharynx	IX	Increases transverse diameter of pharynx during swallow by drawing sides up and lateralward.
	Salpingopharyngeus	Auditory tube	Pharynx Thyroid cartilage	Phar. Plexus	Raises upper and lateral parts of pharynx which are above where the stylopharyngis are attached.

TABLE 1. Muscles Supplied by the Cranial Nerves [1, 2, 3, 4] *(continued)*

Muscles		Bony and Soft Tissue Attachments		Nerve Supply	Muscle Actions
		From	*To*		
Tongue	*Extrinsic Muscles*				
	Chondroglossus	Hyoid	Tongue	XII	
	Genioglossus	Mandible	Hyoid Tongue Pharynx	XII	Post. fibers draw tongue forward protruding apex. Ant. fibers draw tongue back into mouth. Together they draw the dorsum of the tongue downward forming a channel as in sucking (concave).
	Hyoglossus	Hyoid	Tongue	XII	Depresses tongue and draws sides down.
	Styloglossus	Temporal	Tongue	XII	Draws tongue upward and backward.
	Glossopalatinus	See Palate			
	Intrinsic Muscles				
	Longitudinalis Sup.	Tongue	Tongue	XII	Together — shorten tongue. Sup. turns tip and sides up.
	Longitudinalis Inf.	Hyoid	Tongue		Inf. turns tip and sides down.
	Transversus	Tongue	Tongue	XII	Narrows and elongates tongue.
	Verticalis	Tongue	Tongue	XII	Flattens and broadens tongue.
Larynx	*Extrinsic—See neck*				
	Intrinsic				
	Arytenoideus	Arytenoid cartilage	Same	Internal and external branches of sup. laryngeal. recurrent and sympathetic	Closes glottis especially back part.
	Crico-ary. Lateralis	Cricoid cartilage	Arytenoid cartilage		Lateralis—closes glottis.
	" " Posterior				Posterior—opens glottis.
	Cricothyroideus	Cricoid	Thyroid		Elongates folds (falsetto)
	Thyroarytaenoideus	Thyroid	Arytenoid		Shortens cords and relaxes by drawing ary. cart. forward to thyroid, brings cords together. In deglutition draws ary. cart. toward epiglottis.

vary from diminished to absent on stroking either side.

7. *Swallowing*

   a) Ask the patient if he can swallow.
   b) Have the patient attempt a swallow and observe swallowing reflex and the alinement of the head and neck during swallowing. Hold the hyoid bone gently during a swallow to determine the excursion of the bone.

NOTE: The act of swallowing is divided into two phases. The first is a voluntary phase, and the second is an involuntary stage during

TABLE 2. Sample Recording of a Bulbar Evaluation as it Appears in a Patient's Medical History.

P. T. Progress Note March 28, 1957

J. D.—Bulbospinal poliomyelitis onset 2/10/57 age 20 yrs.

Initial Bulbar Evaluation

1. *Jaw*—Normal strength on closing and chewing; jaw in slightly retracted position, slight tightness on opening, protrusion and motion to the left. On protruding, jaw deviates to right, but this and range of motion limitation may be due to malocclusion before poliomyelitis.

2. *Tongue*—Motions good with fair strength, on protrusion tongue deviates to right.

3. *Soft Palate*—Diminished gag reflex, appears to be very little motion of soft palate, but difficult to see due to fluids; nasal voice, cannot close off nose.

4. *Posterior Pharyngeal wall*—Assume there is a great deal of weakness, but impossible to see motion of wall due to fluids; has Levine tube; needs frequent suctioning.

5. *Facial*—Slight left facial weakness most noticeable about mouth musculature.

6. *Hyoid structures*—Tight and there is flattening of posterior neck curve.

7. *Swallowing*—nonswallowing.

8. *Speech*—Nasal, range limited, low pitched.

which the food passes through the pharynx to the esophagus.

During the first stage the food is controlled by the buccinator muscles and the tongue. The tongue drives the food back between the palatine arches by its elevation and pressure against the hard palate. At the same time the base of the tongue is retracted and the larynx is raised with the pharynx. In the second stage the entrance to the larynx is closed by the approximation of the arytenoid cartilages to the cushion of the epiglottis. As the food glides along the epiglottis the palatine arches contract behind it and the palatine velum is raised to close the nasopharynx. The latter is augmented by contraction of the constrictor pharyngis superior. When the food enters the pharynx it is conveyed by the constrictor muscles down into the esophagus.

8. *Larynx*

a) Check for aphonia, hoarseness, breathiness, pitch, and tone range.
b) Have the patient whisper. A whisper does not require strong muscle action.
c) Ask the patient to vocalize high tones to determine the ability to tense the vocal cords. If the muscles performing this action are involved the voice will be rough and deep.
d) Have the patient make marked inspiratory effort without sound. If the abductors are not functioning this exercise will be impossible. Dyspnea, choking, and stridor are apt to occur in bilateral paralysis of the abductors. Phonation is not essentially disturbed.[5]
e) Have the patient make and interrupt a prolonged "ah." During this procedure the glottis must be closed and opened at the control of the patient.
f) Have the patient cough. The vocal cords must first be adducted and pressure built up below the larynx followed by sudden abduction to permit the explosive cough. If the patient lacks the ability to cough, the typical sound made on a cough attempt is similar to clearing the throat.

The method of recording a bulbar examination has not been standardized at this center; however, table 2 is a typical recording of an initial bulbar examination.

PROPER POSITIONING TO PREVENT DEFORMITY

Often the patient with bulbar paralysis also

has severe involvement of the muscles which extend the head, specifically, the suboccipital group which extends between the axis, atlas, and occiput and a more superficial group extending from the upper thoracic and lower cervical vertebrae to the occiput. When the head falls into flexion because of extensor weakness the pharynx is collapsed and the already weakened pharyngeal muscles are shortened to the point of ineffectiveness. This flexion is maintained by the weight of the head pressing against the bed when the patient is supine, or against the back of the wheel chair when the patient is sitting. There is sufficient evidence in extremity work to remind physical therapists of the ineffectiveness of an hour daily treatment when the patient is poorly positioned the remaining 23 hours of a day. The same is true of the muscles of the neck and throat. When the patient is permitted to lie or sit with the head in flexion, weakened extensors are stretched out and the supra and infrahyoid muscles are allowed to tighten. These factors increase the inefficiency of speech and swallowing and make bracing for head support very difficult.

On the basis of these clinical observations, positioning plays a vital role in the treatment program. Molded sponge rubber pads are used early under the neck for proper support. These pads allow the head to fall into a normal resting position relieving the weight of the head against the bed. No pillows are used under the head. Figure 2 illustrates the difference in jaw and throat alinement with and without support in the suboccipital area. When the patient assumes an upright position, a head support is used to aid in swallowing and speech.

A problem encountered less often is that of extreme head extension which is also contraindicated for efficient swallowing. This may be readily demonstrated by attempting to swallow with the head in maximum extension. Proper positioning is indicated early in these cases also.

It is very important that the patient understand and cooperate with the physical therapist and nursing department in this particular phase of the treatment plan. Sufficient time should be spent initially in explaining the purpose and method of positioning. Only then should the nursing department be expected to share the responsibility for proper positioning.

STRETCHING TO MAINTAIN RANGE OF MOTION

1. *Heat*

   Hot packs are indicated to areas of tenderness or pain. Wash cloths wrung from hot water are adequate and easily applied. Such packs should precede stretching.

2. *To gain jaw opening*

   To gain normal range in jaw opening have the patient supine for relaxation of all neck muscles. With posterior neck weakness a pad should be used under the neck. Place retractors between the jaw on the back molars as shown in figure 3a. Stretch gently as the patient actively attempts jaw opening. Stretching can also be done by using the fingers instead of retractors (Fig. 3b). Severe involvement of the muscles which close the jaw may sometimes determine the range sought by this particular stretching. However, sufficient range to permit ordinary dental hygiene and the entrance of food into the mouth is necessary.

   To maintain range of motion in the interval between treatments, have the patient put an object in the mouth at frequent intervals, i.e., tongue blades taped together, and actively assist jaw opening.

   In unilateral involvement, stretch the mandible to the side away from the deviation.

3. *To prevent jaw retraction*

   Place the first finger inside lower teeth and thumb underneath the mandible, pull forward as the patient attempts to protrude the jaw. It is very important that this be done many times daily, if the patient is in the supine position constantly, to counteract the force of gravity on the mandible (Fig. 4).

4. *Hyoid structures*

   Stabilize the jaw with one hand. Hold the hyoid bone with the thumb and index finger of the other hand. Pull down on the hyoid bone. Also move the hyoid bone from side to side (Fig. 5).

5. *Thyroid and cricoid structures*

   Stabilize the hyoid bone with the thumb and index finger of one hand. Grasp the thyroid and cricoid cartilage with the thumb and index finger of the other hand and pull laterally. Stretch downward between the cartilages and hyoid bone (Fig. 1).

6. *Tongue*

   Grasp the sides of the tongue with gauze, stabilize the jaw (avoid squeezing too hard on side of tongue). Pull the tongue forward

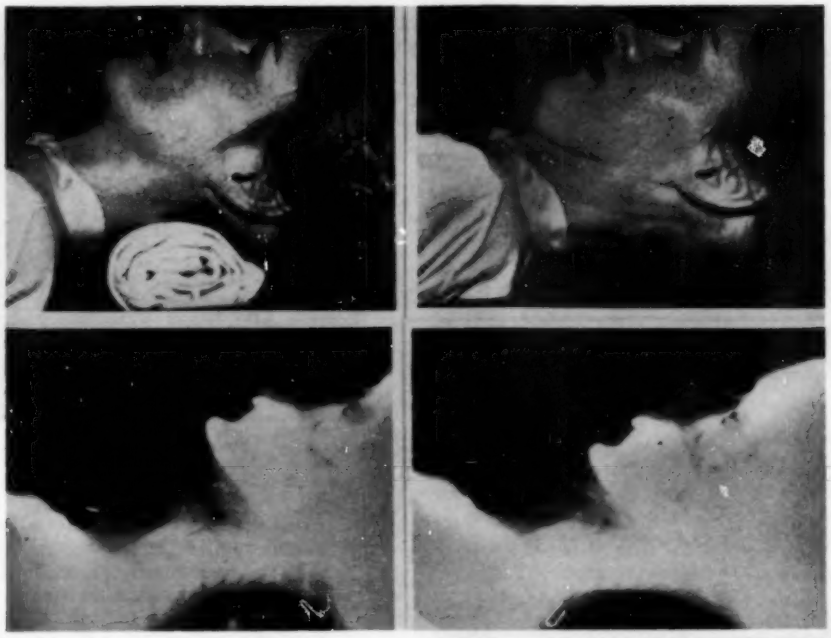

Figure 2. (above) Corresponding visual and X-ray views of patient with and without neck roll for support.

A.

B.

Figure 3. (right) A. Adjustable retractors placed in patient's mouth to stretch masseters, temporales and internal pterygoidei tightness.

B. Position of hands for manual stretching when retractors are not used.

gently but firmly. If the tongue is lifted slightly there is less chance of injury by scraping on the lower teeth. Stretch the tongue laterally (Fig. 6). Any local areas of tightness within the tongue itself, if accessible, should be stretched.

EXERCISES TO INCREASE STRENGTH, COORDINATION, AND FUNCTION

The exercises will follow the same order as listed in the evaluation technics, beginning with the eyelid and continuing through the larynx. Again, the neck flexors and extensors and the muscles of the face will be omitted, except to mention here that early use of neck slings has proved effective in increasing strength of neck muscles.

1. *Eyelid*

   Assist eyelid opening to aid the function of the levator palpebrae and eyelid closing for the orbicularis oculi. Have the patient do active closing and opening.

2. *Eyeball*

   Exercises within the range of active motion and limits of fatigue should be encouraged. Movements can be graduated in intensity as patient progresses. If possible consult ophthalmologist for specific exercises. Occasionally, a patch is prescribed to be worn at alternate times over each eye.

3. *Jaw*

   a) External pterygoideus and digastricus:

Figure 4. Stretching technic to prevent jaw retraction tightness.

Figure 5. Stretching tightness in the suprahyoid structures. Note the stabilization of the mandible.

Assist jaw opening manually or by positioning until sufficient strength to complete the normal range is attained. Follow this with manual resistance which activates the hyoid muscles as well. Have the patient yawn to assist in obtaining maximum opening. Assist jaw protrusion and deviation as indicated and give manual resistance as strength increases. If unilateral weakness of the external pterygoideus muscle is combined with weakness of the muscles which close the jaw, a sling may be used for support.[6]

b) Masseter, temporalis and internal pterygoideus: Assist jaw closing manually. Have the patient bite soft materials such as rubber. As strength progresses use different sized objects for exercises and when more resistance is indicated attempt to pull the objects from the patient's mouth. Chewing double bubble gum gives good resistance. Use care with nonswallowing patients.

4. *Tongue*

   Assist all possible motions (protrusion, deviation, retraction) when weakness indicates, and as strength progresses have the patient do all motions against resistance. Tongue exercises serve also to mobilize and strengthen the hyoid muscles. For example, depression of the hyoid bone, which is a function of infrahyoid muscles can be achieved by having the patient pull the base

of the tongue down and back. Likewise, elevation of the hyoid bone, a function of the suprahyoid muscles, can be accomplished by raising the dorsum of the tongue to the roof of the mouth.

5. *Soft palate, posterior pharyngeal wall and tongue*

These structures work so closely together in phonation, respiration, and swallowing it will be evident that many of the exercises overlap in effect. Therefore the succeeding exercises, though suggested for particular areas, activate in most instances all three structures.

a) Soft palate
- (1) Sounds—Have the patient say "ah," high "ee," run the scale, "k" as in kitty, "ungah," with protruded tongue say forcible "la" or "ha."
- (2) Tongue resistance
- (3) Stimulate gag reflex
- (4) Blow: Feathers, bubbles, straws, balloons, bubble gum, Ping-pong balls up inclined planes, blow bottles to cause exchange of water (Fig. 7, 8).
- (5) Breathe through mouth and nose alternately and through mouth alone. Push air out against closed nose or mouth (but do not release air). Practice holding breath. Use mouth positive. Surge air back and forth from trachea to mouth. Yawn. Suck air in. Whistle.

b) Pharynx
- (1) Sounds—Ah, ee, ungah, run scale (see exercise for soft palate).
- (2) Tongue resistance especially to pulling base of tongue down and back.
- (3) Gargle.
- (4) Stimulate gag reflex.
- (5) Assist swallowing by lifting up on hyoid bone as patient attempts swallow. When swallow is successful begin feeding trials. In the retraining of the nonswallowing patient the team approach of Nursing, Medical and Physical Therapy Departments is extremely important. Adequate and thorough suctioning must be done before, during, and after feeding trials. Food which is not swallowed must be recovered from the trachea or mouth by thorough suctioning. Avoid stimulating the gag reflex. The Levine tube hinders swallowing attempts and creates more mucus; therefore, swallowing trials can be scheduled with the Medical Department in order that the tube be removed. A temporary gastrostomy may be of assistance in training the nonswallowing patient because:
  - (a) It provides sufficient nutrition, and
  - (b) It permits removal of Levine tube which is a hinderance.

  Solid foods rather than liquids seem to be better to start trials on. The Medical Department here recommends starting with foods such as: Jello, puddings, mashed and pureed foods. Strongly flavored and spiced foods should be avoided. When liquids are started, noncarbonated beverages should be used.

Figure 6. Tongue Stretching.

6. *Larynx*

Constantly encourage the patient to talk. Feelings of insecurity and emotional factors play a big role in the success of the treatment program.

a) Have the patient practice: whispering, all sounds and exercises (as yawning) used for soft palate and pharynx, clearing the throat, saying groups of words on one breath, making and interrupting sound.

b) Coughing may be too severe as an early exercise but as the patient progresses, coughing practice should be instituted.

Figure 7. Blow bottles used to strengthen sucking and blowing force of the throat muscles. When used with children, food coloring in the water adds appeal to the exercise.

c) Practice "bearing down."
d) Speech therapy by a speech pathologist.

FOLLOW-UP CARE

The patient is thoroughly instructed in doing his own exercises while undergoing treatment in the hospital. When he is discharged, the parents or relatives are instructed in methods of assisting him or in performing specific exercises themselves. These instructions are usually written and reviewed on the first few subsequent clinic visits. The patient is treated by the physical therapist on an outpatient basis and is checked routinely in the clinic by the physician in charge who determines changes in the patient's program including the termination of treatment visits.

DISCUSSION

The foregoing testing and treatment technics have been established empirically and represent a compilation of ideas of all the therapists and physicians who have been active in retraining the bulbar patient here at Rancho Los Amigos Hospital. The technics are based on the same premise as those used in treating the extremities in spinal poliomyelitis. They have appeared successful in the prevention and relief of contractures and in aiding the subsequent return of function in the bulbar structures.

Patients who were treated early seemed to make more rapid recovery than those who were not. Of the total number of nonswallowing patients treated the majority recovered completely. The remainder of this group, while showing clinical improvement in appearance and mobility of the involved structures, did not show a comparable increase in strength or function and are essentially nonswallowing. Recovery in patients with mild to moderate impairment of swallowing, speech and jaw function was facilitated by proper positioning, increasing range of motion, coordination and strengthening exercises. Certain principles which are basic and apply to any treatment plan should be emphasized. These are:

1. Avoid fatigue.
2. Use proper positioning.
3. Exercise within the patient's potential.
4. Remember that tracheotomy tubes will influence speech.
5. Extracurricular activities as reading, talking, eating, and chewing gum should be closely supervised to insure a follow through of treatment program.
6. Have supervised follow-up care after hospitalization.

Good rapport between the therapist and the patient is an absolute requirement. The patient should feel no fear of the therapist but rather confidence at all times that the therapist is understanding and not reluctant to work with the unpleasant aspects of bulbar treatment. In order to assure this attitude in the patient the facial expression of the therapist should be controlled during such things as suctioning, gagging, and looking into the mouth. This is not easy as the odor of unswallowed saliva is very often unpleasant; neither is it easy to show intense interest in the muscle action and performance by the patient under such circumstances. However, since this is such a vital part of the treatment it merits emphasis.

Therapists must remember also the close relationship between emotions and the life mechanism of breathing. In the respiratory patient, fear of air hunger and death may produce laryngeal tension and inhibit breathing and the coordinate use of muscles. Fear of choking in the nonswallowing patient may produce similar results. Other factors which cause emotional insecurity, such as anger and worry, also have a direct bearing on the breathing pattern and swallowing ability.

SUMMARY

A description of the bulbar technics used at the Respiratory Center for Poliomyelitis, Rancho Los Amigos Hospital, has been presented. This description includes methods of testing and

treating the patient with bulbar involvement. An anatomical review of the muscles supplied by the cranial nerves is included and some basic principles of treatment emphasized. The program appears to be successful.

The prime factors in the treatment program are proper positioning, maintenance of adequate range of motion in the jaw, tongue and throat structures, and exercises to improve coordination and strength which subsequently aid in the return of function.

ACKNOWLEDGMENT

We would like to make special mention of the contribution made by Jeanne Linquist in the preparation of this paper. Much of the preliminary work on patients as well as the writing of the original draft was accomplished by her. This was only one of her many contributions to the staff at Rancho Los Amigos Hospital and to the field of physical therapy in general.

Miss Linquist became ill in March of 1957 and died Nov. 14, 1957. Our department suffered a great loss because Jeanne was an inspiring co-worker as well as friend to us all.

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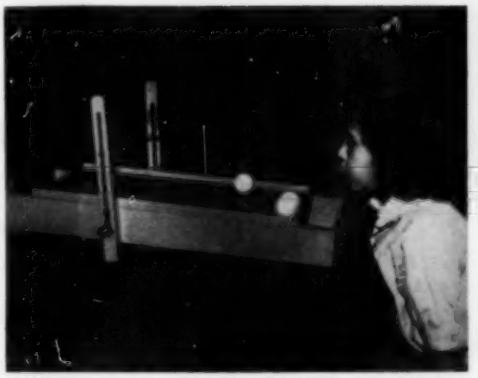

Figure 8. Blowing Ping-pong balls up an inclined plane offers recreation during soft palate strengthening.

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Traineeships for Graduate Study

The American Physical Therapy Association has received a grant for a period ending June 30, 1959, from the Office of Vocational Rehabilitation to administer 15 traineeships of $2,400.00 each for graduate study for physical therapists. Tentative arrangements are as follows:

1. *Eligibility requirements*—the applicant must
   a. have a baccalaureate degree from an accredited college or university,
   b. be a graduate of a school of physical therapy approved by the Council on Medical Education and Hospitals of the American Medical Association,
   c. have a minimum of two years of experience in the clinical aspects of physical therapy,
   d. be a citizen of the United States or in the process of becoming a citizen.
2. *Additional requirements for application*—
   a. Acceptance by the graduate school of choice,
   b. Evidence of physical and mental health,
   c. Proposed program of study, leading to an advanced degree, related to administration or supervision, teaching, research, clinical work.

A Graduate Study Committee, now in the process of being formed, will assume the responsibilities of completing plans for the administration of these traineeships. Physical therapists who are interested in graduate study and in applying for an award are encouraged to make inquiries of graduate schools; have their credits evaluated; discuss plans with faculty members; and outline the expected program. Further information and application forms may be obtained from the American Physical Therapy Association. Applications will be considered in August for those entering September 1958 classes.

Treatment of Whiplash Injury

Josephine F. Alvord

As traffic on our local streets and highways becomes more congested, the physical therapy department at Mount Sinai Hospital is treating an increasing number of cervical neck strains commonly called "whiplash" injuries. This situation undoubtedly prevails in many other hospitals also.

A whiplash injury is frequently the result of a two-car collision at which time the front of the second car rams the rear of the first car. The force of the impact jolts the occupant of the lead car, causing his back to be thrown into a position of acute flexion followed by a snapping backward and forward of the head. These movements occur so rapidly that the automatic protective reflexes of the nervous system are unable to function so as to prevent injury to the ligaments, muscles, and nerves in the cervical area. If the trauma is severe, there may be hemorrhaging in the affected region. Later, a fibrosis may develop around the cervical joints and in the adjacent muscles.

Whiplash is a distressing injury as there is extreme tenderness of the neck and upper shoulders, and the slightest movement of the head may cause the opposing muscles to contract into painful spasms. Severe headaches in the occipital region of the head add to the patient's discomfort and cause the patient to become nervous and apprehensive. There may also be isolated small areas in the scapular region that are sensitive or painful. When there is nerve pressure, such as in cervical disk involvement, pain may radiate down one arm (or both) with tingling sensations and weaken musculature of the shoulder girdle, arm, and hand.

The objectives of treatment are threefold: 1) to reduce tension of the muscles in the neck and shoulder girdle area, 2) to increase range of motion in the cervical area and 3) to relieve discomfort and achieve mental and physical relaxation.

We have found a new and more effective way to apply hot packs using the following materials:

1 plinth
1 regular sized pillow
1 bolster pillow
1 draw sheet
5 turkish towels
1 piece rubber sheeting, approximately 22 by 20 inches
2 to 4 heated Hydrocollator packs, 10 by 12 inches
1 to 3 heated Hydrocollator neck packs, 5 by 12 inches
2 cotton bath blankets

Preparation and treatment

Place standard sized pillow at head of plinth. Lay draw sheet, folded lengthwise, over pillow, with ends of sheet evenly draped over each side of plinth. Place rubber sheeting over pillow on top of draw sheet, with top edge of rubber sheeting meeting top edge of pillow. Place 5 by 12 inch neck pack about 4 inches from the top of the pillow. Center the two 10 by 12 inch packs directly below the neck pack, as shown in figure 1.

Fold each cotton blanket to make 8 layers, and place both blankets in a horizontal position, (each about 1 inch lower than the other) over the pillow, being sure that the hot packs are covered by the 16 layers. Fold 2 turkish towels in quarters and put them on the blankets which cover the lower half of the 10 by 12 inch packs, placing 1 towel about an inch below the other. This arrangement of padding is necessary to avoid an uncomfortable ridge and also for adequate protection from burns. Place a clean turkish towel over the entire packing material and put the patient in a supine position with the hot packs against the occipital area of the skull, the posterior neck and the complete scapular area. If the anterior neck muscles are involved, packs over the sternocleidomastoids will be required. If there is pain radiating down the arm, a hot pack may be applied over the upper chest and the anterior aspect of the shoulder. Bring the upper corners of the draw sheet over the shoulders and and pin in front as a shawl. This presses the packs against areas of the upper trapezei. Fold 2 or 3 turkish towels in quarters, roll together, and place *under* the pillow to press the packs against the nape of the neck. Put the bolster pil-

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low under the knees to induce relaxation of the lower back and legs. The patient is instructed to tell the therapist if areas being treated have a burning sensation. Suggest he close his eyes and relax for the duration of the treatment.

At the end of 30 minutes, the packs are removed and the patient is assisted to a prone position with a pillow under the abdomen and a bolster pillow under the ankles with feet hanging over the end of the plinth. The hands are placed palms downward with flexed elbows located slightly below shoulder level. The writer has found that more effective massage can be obtained by standing at the head of the plinth and using a downward pressure. Massage should cover the cervical and dorsal areas with specific emphasis on massaging the occipital area of the head and the region of the upper trapezei. The writer prefers a downward stroke rather than upward pressure to obtain relaxation of spastic or tense muscles.

In general, during the second treatment intermittent traction is administered after the heat and massage. The patient dresses except for fastening any tight clothing around the neck, and traction is applied from a sitting position. (For patients who require hospitalization, traction may be applied with the patient lying in the supine position.) Traction is started with 10 pounds of pressure, alternating 20 seconds on and 10 seconds off for 5 minutes. On the third visit, traction time is increased to 10 minutes and on the fourth treatment to 15 minutes. The length of time then remains at 15 minutes but at each successive visit the pressure is increased by 2 pounds until the patient is tolerating 22 pounds. On the next visit, the time is increased to 20 minutes. After these limits have been reached, the improvement of the patient determines when intermittent traction is to be raised gradually to 30 seconds on and 10 off.

When the patient becomes less apprehensive—this usually occurs during the course of the 15 minute sessions of intermittent traction—steady traction is added to introduce exercises. Following the intermittent traction, the machine is switched to steady traction. The patient is instructed to stabilize his shoulders against the back of the chair and to rotate his head alternately to the right and left twice. Later this exercise is changed to active assistive movements.

When the patient, under traction, willingly performs neck rotation, rhythmic exercises are instituted. The patient sits in a standard straight chair and the therapist stands in back of the patient, firmly gripping the patient's head. The

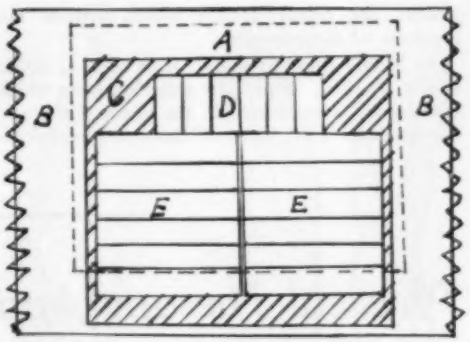

Figure 1.

A. Pillow
B. Draw Sheet
C. Rubber sheet
D. Neck pack
E. Standard sized packs

patient is instructed to keep his eyes closed to help prevent dizziness. Smooth rhythmic alternating movements of neck flexion and neck extension are given. Lateral flexion, alternating right and left, is the next step and is followed by rotation. Finally, head rolling, 3 times in each direction completes the routine. All of these exercises are instituted for the purpose of teaching the patient proper muscular control in order to eliminate undue tension of the opposing muscles. If lateral flexion is limited and does not respond to the above procedure, resistive action in the inner range to active assistive in the outer range—all in one movement—is given following the rhythmic lateral flexion. A maximum of 3 lateral flexions of this type are administered.

Transition from a mild to a more strenuous treatment is gradual. It must be borne in mind that the patient is usually suffering from nervous tension in addition to his physical disability. The treatment may remain at the same status for several days before progression is attempted. This applies particularly to increasing the routine of cervical traction after the 10 minute period has been gained. Occasionally a patient will tolerate an increase of traction weight before he can comfortably attain the 15 minute period.

The first visit takes about 45 minutes but the treatment time is gradually increased to an hour and a half as the patient develops more tolerance. To reach maximum time usually takes 4 weeks. When the patient is receiving full treatment, there should be less tension of the neck muscles and freer range of motion. The patient should be able to report a decrease of discomfort. As in other types of disability, the extent of injury and the emotional stability of the

patient are major factors which govern the progress of improvement.

At Mount Sinai Hospital, from Oct. 1, 1956, to Oct. 1, 1957, 70 patients suffering from whiplash injury were treated in the physical therapy department. Fifty-nine of these responded to the treatment described above. Of the remaining 11 who did not obtain satisfactory results, 1 had extensive paralysis and 6 did not complete the prescribed course of treatments.

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Physical Therapy Applied to Leprosy Cases

Judith Arnon, I.S.P.

INTRODUCTION

The pathology of leprosy and the systematic therapy to be given has been amply described in various monographs.[1,2,3] This article is concerned only with the physical therapy of the neural and the hypopigmentation types of the disease. The patients were treated in the Dermatology Department of the Base Military Hospital, Rangoon. Most of the 150 patients treated were of the lepromatous or infectious type. Of these, 40 patients were given different forms of physical therapy.

The purpose of this paper is to give the characteristics of these two types of the disease and to summarize our experience with a group of 40 leprosy patients.

GROUP A. NEURAL-TYPE LEPROSY (NEURAL ANESTHETIC)

In its neural localization there is a perineural infiltration of mononuclear cells accompanied by degeneration of the axones which are eventually replaced by fibrosis. Not all axones in a given nerve trunk are involved. The involvement is limited to sensory and trophic nerves, leaving the motor ones free. The contractures of the extremities and various motor incapacities frequently seen in advanced neural leprosy are the result of trophic changes in the muscles and subsequent muscular imbalance. It stands to reason that this condition offers a wide field for rehabilitation by physical therapy.

This type of leprosy which is considered noninfectious, has been kept under control by the regular administration of Sulfon tablets. In a number of patients an appreciable improvement has been noted. In some cases injections of Sulphetron was administered along the affected nerve. Of this group 30 patients received physical therapy. The results of their examination, classification, and type are given here.

From the personal history of these patients it is noteworthy that the first sign which brought them to seek medical attention was sensory loss over some parts of their bodies or the appearance of white patches. Examination revealed different types of lesions in their extremities.

1. *Upper extremity:* The ulnar nerve is the first to be affected, either alone or in association with the median nerve. In rare cases all three nerves—radial, ulnar, and median—are involved. The involved ulnar nerve is palpable as a thick cord, 0.5 cm in diameter extending from the medial epicondyle up to the axilla. This finding is accompanied by marked wasting of the hypothenar and interosseous muscles. In some of these cases, patients complain of pain and tenderness along the ulnar nerve, radiating distally. In all cases there was a definite loss of sensation in the affected arm. There was complete sensory loss in some areas, and others were dull to pinprick. (See fig. 1, 2, 3.)

Owing to the presence of numbness, many patients soon develop a sense of nervousness and quite often do not use the affected limb to the full capacity, thus disuse atrophy and contractures result.

To relieve the distressing neuritic pain, Lt. Col. P. Lakshmipathy, M.B.B.S., F.R.C.S.,* Commanding Base Military Hospital, Maymyo, performed 21 sheath resection operations on the ulnar nerve. Most of these patients had been given the diag-

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Formerly Advisor in Physiotherapy to the Ministry of Defence, Government of Burma, Base Military Hospital, Rangoon, during 1956–1957.

* I am indebted to Lt. Col. Lakshmipathy, M.B.B.S., F.R.C.S., for his kind permission to publish his results.

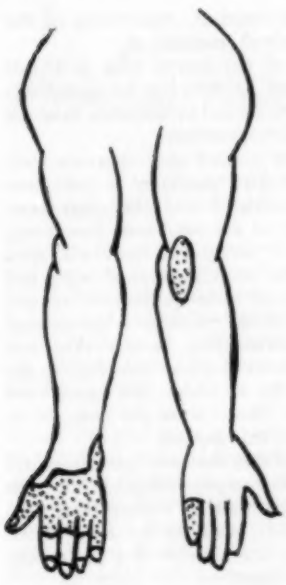

Figure 1. Ulnar type lesion. Areas marked were dull to pin-prick.

Figure 2. Ulnar-median type lesion. Areas of complete sensory loss (black) and dull to pin-prick (dotted).

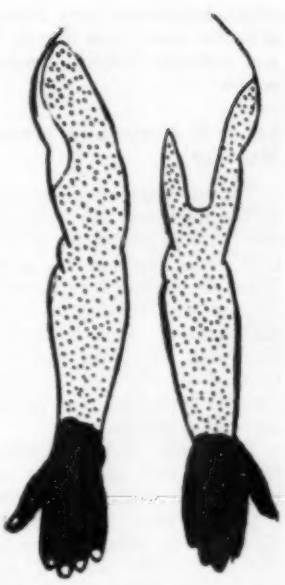

Figure 3. Ulnar-median-radial type lesion. Areas of complete loss of sensation (black) and areas dull to pin-prick (dotted).

nosis of ulnar neuritis. The criteria used in diagnosis of these cases were:

a) The ulnar nerve must reveal thickening when examined clinically. During examination the "feel" of the nerve must be compared with the opposite side or, in bilateral cases, palpation of a normal in the patient's own age group is necessary.

b) Tenderness and pain must be present along the course of the ulnar nerve in the arm and radiating distally. The severity must be such that it interferes with the patient's sleep or well-being.

c) When wasting of intrinsic muscles of the hand is present these patients usually do not complain of pain and tenderness. If there is no atrophy of intrinsic muscles, ulnar sheath resection may prevent further atrophy. If wasting has already occurred, then operation does not reverse the muscular paralytic effect, although there is definite alleviation of pain.

During the sheath resection the epineurium is excised to the extent of two thirds of the nerve circumference throughout the entire thickened length. (Usually the thickening is found both proximal and distal to the point where the nerve pierces the medial intermuscular septum and distally to the elbow.) Then the nerve bundles with yellow caseous material adhering to the bundle fibrils are removed entirely through curetting. Finally, the fascia and skin over the nerve is sutured without any attempt to suture the nerve sheath.

Postoperatively, the patients were free from pain and tenderness and the hand improved functionally. Atrophy of muscles of the hand was prevented in this series of cases.

2. *Lower extremity:* In this group the lateral popliteal nerve is the first to be affected. The superficial peroneal nerve is palpable as a thick cord along the posterolateral surface of the leg. This is usually followed by a dropped foot, caused mainly by the weakness of the peronei longus and brevis. In some cases an extremely strong tibialis anterior and extensor hallucis longus, caused an inversion deformity of the foot. Diminishing power in the extensor digi-

torum longus indicates involvement of the deep peroneal nerve even though the tibialis anterior and extensor hallucis longus may be strongly active.

GROUP B. HYPOPIGMENTATION LEPROSY (SIMPLE MACULAR)

The cutaneous manifestation of leprosy begins in the papillary and subpapillary layers of the skin with aggregations of epitheloid cells, giant cells, and lymphocytes about the capillaries. Thus, the dermis is thickened and the epidermis thinned with ensuing hyperkeratosis and hypopigmentation. The treatment of hypopigmentation with ultraviolet radiation appeared to be rational in view of its stimulating action of pigment formation, and its dilating effect on the superficial capillaries.

Ten cases of hypopigmentation were given treatment with ultraviolet rays. The areas of hypopigmentation were usually located on the limbs and back. They varied in size from 3 to 12 inches in diameter, the larger appearing on the back. The affected areas had complete sensory loss and the surrounding skin was thicker and of a darker color.

METHODS OF TREATMENT

Group A.—This group of 30 patients was treated by electric stimulation, passive movements, and assisted active exercises. In addition, various games were selected to obtain the effects desired in individual cases.

Group B.—This group of 10 patients was treated every other day with gradually increased application of ultraviolet rays to each individual area. Treatment commenced with half a minute at a distance of 35 inches and increased up to the maximum of 6 minutes. In each case irradiation time was increased gradually to avoid inflammatory reactions. The normal skin areas were protected by masking.

RESULTS

Group A.—As a result of treatment the patients showed great improvement of muscle power. The contractures were decreased and straightened; however, there was no appreciable change in electrical reaction. Anesthesia of the various limbs remained unchanged.

Early diagnosis of the neural type is highly desirable and should be followed by immediate physical therapy in order to prevent eventual disuse atrophy and contractures.

Group B.—It was noticed that approximately 12 hours after the first treatment a mild first degree erythema developed, and after four treatments pigmentation of the until now completely white areas could be seen. The anesthetic area was identical to the deep pigmented area and the pigmentation was most prominent around the periphery. After 20 treatments the normal brown color of surrounding healthy skin was apparent and this color did not fade during the period of four weeks in which the cases were under observation. There were no changes in the sensation during this period.

In spite of the fact that the anesthetic areas did not regain sensation, the psychological effect on the patient of repigmentation cannot be underestimated, particularly when in the eyes of the layman white areas are associated with leprosy and the stigma of a leper.

SUMMARY AND CONCLUSION

Forty patients having leprosy affecting nerve and skin were given various types of physical therapy. In 30 patients with upper and lower extremity paralysis, therapy increased muscle strength, prevented and released contractures, and was extremely valuable in maintaining and elevating the patient's psychological status. No improvement of sensation was noted.

In 10 patients having hypopigmentation, ultraviolet radiation brought about the repigmentation of the affected areas with no improvement relative to sensation. Here again, patients benefited psychologically. It is felt that physical therapy could be of still greater benefit in leprosy cases were more physical therapists interested in this field.

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Physical Therapy in Industry

John A. Akerstrom, B.A.

Definition

Physical therapy in industry is essentially physical therapy as it applies to orthopedics. It differs, however, in some important respects. First, it is limited to conditions in which trauma is the direct cause or in which trauma has aggravated an already existing disease. Secondly, it is limited to work injuries and occupational diseases. A work injury may be defined as "any injury suffered by a person which arises out of and in the course of his employment." "An occupational disease is a disease caused by environmental factors, the exposure to which is peculiar to a particular process, trade or occupation, and to which the employee is not ordinarily subjected or exposed outside of or away from such employment." [1]

Unique Features

Physical therapy as it is practiced in industry is unique in that the physical therapist treats a vast number of soft tissue lesions. Such lesions are rarely treated by physical therapists employed in another capacity except by the few whose responsibility it is to care for athletic injuries. This is particularly true of minor traumatic conditions or lesions of soft tissue which require no surgery or other special orthopedic care.

Importance of Treating Minor Injuries

To state that the industrial physical therapist treats a great number of soft tissue lesions, many of which are classified as "minor," might give the impression that this phase of his work is of little significance. Yet, as we consider that the residual effects of many soft tissue injuries can cause chronic or partial disability, it becomes evident that we have a definite responsibility in their treatment. Even as we consider the edema and hyperemia that follow a severe contusion, particularly to a hand or foot, with possible resultant stasis, fibrosis, and soft tissue induration, there can be no doubt of the need and importance of early and adequate physical therapy care. This need becomes of even greater significance as we consider such injuries to soft tissue as severe sprains and strains in which we may also cope with joint instability, limitation of joint range, and muscular weakness. It is a well known fact, but worthy of reiteration, that, in regard to both healing and return of function, the more severe soft tissue lesions often require as long a period or a longer period for their recovery than many uncomplicated fractures.

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Basis for Determining Physical Therapy Needs in Industry

We might expect that conditions treated by an industrial physical therapy department would vary only slightly from industry to industry. On the other hand, it is reasonable to assume, and facts bear this out, that there is a considerable variance in the frequency and severity of these injuries. The National Safety Council publishes statistics each year in a booklet entitled "Accident Facts" showing the frequency and severity rates of injuries in our country's leading industries. From these statistics we can determine with some degree of accuracy the comparative physical therapy needs of these industries.

Definition of Terms

These statistics and their meaning can be more easily understood if the terms are defined. These terms, as interpreted in the "American Standard Method of Recording and Measuring Work Injury Experience," [1] are as follows:

1. *frequency rate*—the number of injuries per 1,000,000 man hours of exposure.

2. *exposure*—total number of employee-hours worked by all employees including those in operation, production, maintenance, transportation, clerical, administrative, sales and other activities.

3. *severity rate*—total number of days charged (or lost) per 1,000,000 employee-hours of exposure.

4. *permanent, total disability*—any injury

other than death which permanently and totally incapacitates an employee from following any gainful occupation, or which results in the loss of or the complete loss of use of any of the following in one accident:

a) both eyes,

b) one eye and one hand, or arm, or leg, or foot,

c) any two of the following not on the same limb: hand, arm, foot or leg.

5. *permanent, partial disability*—any injury other than death or permanent, total disability which results in the complete loss of use of any member of the body, or any impairment of function of the body or part thereof, regardless of any preexisting disability of the injured member or impaired body function.

6. *temporary, total disability*—any injury which does not result in death or permanent impairment but which renders the injured person unable to perform a regularly established job which is open and available to him during the entire time interval corresponding to the hours of his regular shift on any one or more days.

7. *classifications of work injury*—the classifications discussed here and given below, that is, "permanent, total disability," "permanent, partial disability," and "temporary, total disability."

Industrial Injury Frequency and Severity Rates

Table I shows the injury frequency and severity rates of 40 leading industries for the year 1956 and, at the top of each column, the average rates for all industries.[2]

Comparative Physical Therapy Needs in Industry

As we attempt to approximate physical therapy needs in industry, it is difficult to ascertain which industries with frequency and severity rates below the industrial average need our services. The needs expressed in table II have been determined on a comparative basis; that is, frequency and severity rates of one industry are compared with another and with the average rates for all industries. The fact that this company employs physical therapy extensively in the treatment of permanent, partial and temporary, total disabilities indicates that the rubber industry, with below average frequency and severity rates, has recognized the need for physical therapy. If this assumption is correct then it might be assumed that all other industries with similar rates have this need. In order that no industry is overlooked, these assumptions have been made and are so indicated. Another factor which deserves consideration is the existence of a fourth classification of work injury, which, for the purpose of this discussion only, may be called "temporary, partial disabilities." These disabilities do not incapacitate the worker to the extent that he is unable to do his work. Consequently, they are of no significance from the standpoint of severity and are not included in these statistics. Yet, they occur with great frequency and, if neglected or treated inadequately, may result in temporary, total disability. A third problem concerns the interpretation of the term "temporary, total disability." This term may have a different meaning in different industries depending upon what physical skills are required of a worker to do his job efficiently. In other words, a certain disability incurred by a worker in one industry may be physically incapacitating while in another industry it may not be a hindrance.

To comprehend more fully the meaning of frequency and severity rates it might be helpful to know that 1,000,000 man hours is equivalent to the time worked by 500 employees in a year's time. It might be helpful to know, too, that a specific number of days is charged for dismemberment and impairment of function. In instances in which such loss or impairment causes a permanent, total disability or death, 6,000 days are charged. In instances in which such loss or impairment causes a permanent, partial or temporary, total disability, the number of days charged or lost varies with the part of the body involved and the extent of injury. Regarding permanent, total disabilities, therefore, it is possible to determine the severity rate by simply multiplying the frequency rate given by 6,000. For example, the lumber industry has a frequency rate for permanent, total disabilities of .19. Consequently, the severity rate for these disabilities is 6,000 x .19 or 1,140. On the other hand, it is impossible to determine from the above statistics the severity rate for either permanent, partial disabilities or temporary, total disabilities, although the combined severity rate for the two may be determined easily by subtracting the severity rate for permanent, total disabilities from the severity rate for all disabilities. The severity rate for all disabilities in the lumber industry is 2,436; thus, 2,436 minus 1,140 or 1,296 would be the combined severity

TABLE 1.

NAME OF INDUSTRY	FREQUENCY RATES					SEVERITY RATES	
	Fatal, Perm. Total	Perm. Partial Disab.	Temp. Total Disab.	All Disab.	Rank all Dis.	Rate	Rank
All reporting Industries	.07	.40	5.91	6.38		733	
Aircraft Manufacturing	.02	.19	1.71	1.92	2	227	8
Air Transport	.10	.08	14.47	14.65	35	791	23
Automobile	.01	.37	2.18	2.56	4	280	10
Cement	.19	.43	2.46	3.08	5	1588	34
Chemical	.04	.27	3.07	3.38	8	462	16
Clay Products	.11	.58	9.40	10.09	31	1151	31
Communications	.01	.01	.97	.99	1	58	1
Construction	.28	.60	18.22	19.10	36	2375	37
Electrical Equipment	.01	.33	1.67	2.01	3	156	6
Electric Utilities	.16	.35	6.33	6.84	20	1384	33
Food	.06	.75	10.15	10.96	33	878	30
Foundry	.04	.89	9.39	10.32	32	876	29
Gas Utilities	.07	.23	8.38	8.68	27	652	20
Glass	.02	.48	5.08	5.58	15	543	17
Iron & Steel Products	.05	.98	7.69	8.72	28	770	22
Leather	.00	.33	7.23	7.56	23	121	4
Lumber	.19	1.09	21.04	22.32	38	2436	38
Machinery	.02	.59	5.36	5.97	17	397	13
Marine Transportation	.11	.89	31.48	32.48	40	2183	35
Meat Packing	.03	.49	7.48	8.00	25	461	15
Mining, Undergr'd Coal	.64	1.45	20.98	#23.07	39	#5770	40
Mining, except Underground Coal	.19	1.12	18.62	#19.93	37	#2290	36
Miscellaneous Mfg.	.00	.53	4.71	5.24	13	274	9
Non-Ferrous Metals & Products	.08	1.03	7.16	8.27	26	1234	32
Petroleum	.10	.27	6.89	7.26	22	861	28
Printing & Publishing	.00	.47	5.56	6.03	18	181	7
Pulp and Paper	.07	.63	6.54	7.24	21	836	26
Quarry	.33	.55	9.13	10.01	30	3136	39
Railroad Equipment	.03	.50	5.36	5.89	16	596	19
Railroads*	–	–	–	15.30	–	–	–
Rubber	.01	.34	2.93	3.28	7	328	12
Service	.00	.00	6.06	6.06	19	108	3
Sheet Metal Products	.03	.73	3.94	4.70	11	554	18
Shipbuilding	.06	.32	4.18	4.56	10	667	21
Steel	.08	.48	3.27	3.83	9	850	27
Storage & Warehousing	.03	.19	4.63	4.85	12	314	11
Textile	.02	.49	4.78	5.29	14	455	14
Tobacco	.00	.16	3.11	3.27	6	82	2
Transit	.09	.14	11.43	11.66	34	828	25
Wholesale & Retail Trade	.00	.08	7.67	7.75	24	124	5
Wood Products	.05	.96	8.62	9.63	29	818	24

#—1955 Rates.
*—Information not available for computing severity rate covering all employees, so railroads are not included in all-industry average rates.

TABLE 2.

NAME OF INDUSTRY	PHYSICAL THERAPY NEEDS		
	Rehab. Severely Handicapped	Treatment-Partial Disab.	Treatment+ Temporary Disab.
Aircraft Manufacturing	0	0	0
Air Transport	1	0	2
Automobile	0	-1	0
Cement	2	1	-1
Chemical	0	0	-1
Clay Products	1	1	1
Communications	0	0	0
Construction	2	1	2
Electrical Equipment	0	-1	0
Electric Utilities	1	-1	1
Food	0	2	1
Foundry	0	2	1
Gas Utilities	1	0	1
Glass	0	1	-1
Iron & Steel Products	0	2	1
Leather	0	-1	1
Lumber	2	3	3
Machinery	0	1	-1
Marine Transportation	1	2	3
Meat Packing	0	1	1
Mining, Underground Coal	3	3	3
Min'g. except Undergr'd Coal	2	3	2
Miscellaneous Mfg.	0	1	-1
Non-Ferrous Metals & Products	1	3	1
Petroleum	1	0	1
Printing & Publishing	0	1	-1
Pulp & Paper	1	1	1
Quarry	2	1	1
Railroad Equipment	0	1	-1
Rubber	0	-1	-1
Service	0	0	1
Sheet Metal Products	0	2	-1
Shipbuilding	0	-1	-1
Steel	1	1	-1
Storage & Warehousing	0	0	-1
Textile	0	1	-1
Tobacco	0	0	-1
Transit	1	0	2
Wholesale & Retail Trade	0	0	1
Wood Products	0	2	2

0—There is little or no need except, possibly, in large companies.
−1—A need exists even though frequency and severity rates are below the industrial average. Basis: Needs of this company.
1—The need is average or slightly above average.
2—The need is considerably above average.
3—The need is far above average.

TABLE 3.

INDUSTRY	FREQUENCY RATE			SEVERITY RATE			PROBABLE P.T. NEEDS	
	Below Aver.	Above Aver.	High	Below Aver.	Above Aver.	High	Greatest	Least
CHEMICAL								
Fertilizer		X				X	1,2	3
Fuses & Powder	Low				X		1,2	3
High Explosives	Low				X		1,2	3
FOOD								
Beverages, non-alcoholic			X	Low			2,3	1
Ice Manufacturing			X			X	1,2,3	
Sugar, Beet			X			X	1,2,3	
Sugar, Cane			X		X		2,3	1
NON-FERROUS METALS & PRODUCTS								
Ore Preparation		X				X*	1,2	3
STORAGE & WARE-HOUSING								
Cold Storage			X	X			2,3	1
Grain Elevators			X			X*	1,2	3

*—Rate is exceptionally high.
1—Need: Rehab. of Severely Handicapped.
2—Need: Treatment of Partial Disabilities.
3—Need: Treatment of Temporary Disabilities.

rate for permanent, partial and temporary, total disabilities.

In table II, the physical therapy needs may be expressed as "Need for Rehabilitation of the Severely Handicapped" (permanent, total disabilities), "Need for Treatment of Partial Disabilities" (permanent, partial disabilities) and "Need for Treatment of Temporary Disabilities" (temporary, total disabilities).

Needs in Specific Industries

A report compiled by the National Safety Council [2] gives frequency (all disabilities) and severity rates for the industries named as well as the subdivisions of these industries for the years 1954 through 1956. Using this report, a list of industries having high frequency and/or severity rates is given. The report referred to does not give frequency rates for each of the three classifications of work injury but only the frequency rates for all disabilities (sum total of the three). It is more difficult, therefore, to determine the physical therapy needs than in the previous instance. It should be noted, however, that by comparing these rates to the average for all industries and by studying the correlation between the frequency and severity rates given, certain general conclusions may be made, as follows:

1. A high severity plus a high frequency equals a high incidence of injury in all three classifications of work injury. NEED: All three physical therapy services.

2. A high severity plus a low frequency equals a high incidence of permanent, total and/or permanent, partial disability. NEED: Rehabilitation of the severely handicapped and treatment of partial disabilities.

3. A low severity plus a high frequency equals a high incidence of temporary, total and/or permanent, partial disabilities. NEED: Treatment of temporary disabilities and partial disabilities.

Table III shows six industries and their subdivisions which have significantly high frequency and/or severity rates.

In table IV industries listed under Chemical, Food, Non-Ferrous Metals and Products and Storage and Warehousing have either high frequency and/or severity rates or there is a significant correlation between frequency and severity rates.

Scope and Incidence of Industrial Injuries

As was stated in the beginning, physical therapy in industry is limited to conditions in which trauma is the direct cause or in which trauma has aggravated an already existing disease. Further, it is limited to work injuries and occupational diseases.

TABLE 4.

NAME OF INDUSTRY	FREQUENCY		SEVERITY		PROBABLE NEEDS	P.T.
	Above Aver.	High	Above Aver.	High	Greatest	Least
CONSTRUCTION						
Concrete bridge, dam, etc.	X			X	1,2	3
Construction, not building		X		X	1,2,3	
Building Construction, Gen.		X	X		2,3	1
Heavy Construction		X		X	1,2,3	
Highway Construction		X		X	1,2,3	
Marine Construction	X			X	1,2	3
Public Utility Construction	X			X	1,2	3
State Highway Department		X		X	1,2,3	
Structural & Ornamental Metal		X		X*	1,2,3	
Tunnel, subway, caisson		X		X	1,2,3	
LUMBER						
Logging		X		X*	1,2,3	
Saw Mills		X		X	1,2,3	
Wood Preserving		X		X	1,2,3	
MARINE TRANSPORTATION						
Stevedoring		X*		X	2,3	1
Tanker, Cargo Vessels	X			X	1,2,3	
MINING, UNDERGROUND COAL						
Anthracite		X*		X*	1,2,3	
Bituminous		X		X*	1,2,3	
MINING, UNDERGR'D, EXCEPT COAL						
Metal		X		X*	1,2,3	
Non-Metal		X		X*	1,2,3	
QUARRY						
Stone	X			X	1,2	3
Sand & Gravel	X			X*	1,2	3

*—Exceptionally High
1—Need: Rehab. of Severely Handicapped
2—Need: Treatment of partial disabilities
3—Need: Treatment of temporary disabilities

Note: Only the subdivisions of the above industries have rates that are of particular significance. The Chemical, Food, Non-Ferrous Metals & Products and Storage & Warehousing industries, themselves, are not outstanding in this respect.

These limitations have a significant effect on the scope of conditions treated by the industrial physical therapist as well as the extent to which he treats some of them. Regarding the latter, for example, osteoarthritis and postural disorders are treated only when trauma is considered a cause of aggravation. The same applies to rheumatoid arthritis and congenital anomalies. As a consequence, the number of cases treated in each of these instances is much lower than in other physical therapy departments.

A problem which often confronts the industrial physician is that of making accurate diagnosis in low back conditions and various painful conditions throughout the body, particularly those of the trunk which, because of their nonspecificity, are difficult to classify. As a result, the use of such terms for diagnosis as myositis, myalgia, fascitis, myofascitis, low back syndrome and radiohumeral syndrome is not uncommon. It is important to note, however, that the use of such terms serves a definite purpose. First, for the most part, these terms indicate which tissues are involved and are far more descriptive to the physical therapist than "pain in the hip," "pain in the back," etc. Secondly, a term such as low back syndrome indicates that the exact nature of the lesion has not yet been determined; thus, care should be exercised in administering treatment, particularly therapeutic exercise.

The scope and order of incidence of industrial injuries treated at this company by physical therapy, as well as the parts of the body most frequently involved, are listed. During a 5 year period 3,160 cases were referred for treatment and have been considered in this report. It should be noted that the diagnoses given were original diagnoses. Consequently, in some instances, the number of cases would differ from the number indicated. Particular reference is made to condi-

tions of the low back which frequently required a longer time and more extensive examination in order to determine a definite diagnosis. The number of disk lesions, for example, should be higher than the number given.

To understand better the types of injuries treated by the industrial physical therapist and why their incidence is peculiar to industry, the following classifications have been used: 1) conditions in which trauma is the direct cause, 2) conditions in which trauma has aggravated an already existing disease, 3) conditions in which an occupational factor is significant (occupational disease), 4) nonspecific conditions in which trauma may or may not be the cause. The numerical designations given will be used under "Classification" (Class).

Name of Condition	*No. of Cases*	*Class*	*Common Sites* (By regional anatomy in order of incidence)	
1. *Sprains and strains*	1,110	1	Back **	Scapular area
			Shoulder *	Chest & Ribs
			Knee	Arm
			Neck	Elbow
			Wrist	Hand & Fingers
			Ankle	Thigh & Hip
COMMENTS: Sprain, here, refers to the stretching or possible tearing of the supportive ligaments of a joint resulting from excessive and forced joint movement. Strain has a similar meaning but refers to the stretching or minor tearing of tendons and muscles.				
2. *Contusions*	718	1	Back, Hip & Coccyx *	Fingers
				Thigh & Buttocks
			Elbow *	Head & Neck
			Knee	Forearm
			Foot	Groin
			Chest & Ribs	Scapular area
			Hand & Wrist	Toes
COMMENTS: Indicating the common sites is of no particular significance from a treatment standpoint. Sites are named only because of the large number of cases.				
3. *Low back syndrome*	388	4		
COMMENTS: Many of these cases were later found to be disk lesions, severe sprains and strains, complications resulting from congenital anomalies, postural disorders, osteoarthritis, etc.				
4. *Fractures*	218	1	Fingers **	Toes
			Foot *	Leg
			Forearm	Ankle
			Hand	Ribs
			Wrist	
COMMENTS: Undoubtedly, the use of safety shoes by many employees has prevented a large number of toe fractures.				
5. *Myositis, myalgia, fascitis and myofascitis*	143	4		
COMMENTS: Common sites were not listed because of the nonspecificity of conditions included here. *Myositis* was used commonly in reference to painful conditions of the neck and back. *Fascitis* was used rather frequently in reference to pain and tightness of the fascia lata.				
6. *Skin avulsions, lacerations, puncture wounds, abrasions, adherrent scars & adhesions*	133	1		
COMMENTS: Common sites were not listed because of the superficial nature of many of these lesions and irrelevance, from treatment standpoint, of knowing location.				
7. *Bursitis*	111	1, 3	Shoulder*, Elbow*, Knee	
COMMENTS: The cause of some of these cases was undetermined; otherwise, either trauma (a direct blow) or an occupational factor was involved.				
8. *Tendinitis, tenovaginitis, synovitis, tenosynovitis*	83	1, 3		
COMMENTS: Bicipital tendinitis and tendinitis at the lateral aspect of the elbow were				

Name of Condition	*No. of Cases*	*Class*	*Common Sites* (By regional anatomy in order of incidence)

fairly common. As synovial tendon sheaths are dominant at the wrist and ankle, these are the sites for most sheath lesions. Terms were used to indicate inflammation of a tendon (*tendinitis*), a synovial tendon sheath (*synovitis or tenovaginitis*) or of a tendon and its sheath (*tenosynovitis*). Synovitis sometimes referred to inflammation of the synovial membrane of a joint, particularly the knee joint.
NOTE: Except for amputations, common sites and order of incidence were not specifically determined for the following conditions because of the limited number of cases considered.

9.	*Osteoarthritis*	47	2	
10.	*Muscle and tendon tears and lacerations*	41	1	

COMMENTS: These cases may be distinguished from strains, as defined above, in that muscle and tendon tearing and laceration were extensive and, in many instances, required surgical repair.

11.	*Amputations*	36	1	Fingers **, Hand, Foot

COMMENTS: Parts of the body are named only to show that, like fractures, small body parts are principally involved.

12.	*Neuritis and neuralgia*	35	1, 4	

COMMENTS: In some cases, the cause of nerve inflammation was undetermined; in others, "traumatic neuritis" was a definite finding.

13.	*Disk lesions* (*potential, preoperative and postoperative*)	32	1	

COMMENTS: Includes cervical, thoracic and lumbar. The term "potential disk lesion" was used when the existence of a disk was strongly suspected; however, as symptoms were not severe at the time, diagnosis was not definitely established.

MISCELLANEOUS CONDITIONS
(from standpoint of incidence)
Total Number of Cases—65

14.	*Hematomas*	1	
15.	*Radiohumeral syndrome*	1, 3	

COMMENTS: Many of these cases were later named radiohumeral bursitis, tendinitis, epicondylitis or tennis elbow.

16.	*Cervical root syndrome*	1, 2	

COMMENTS: In these cases, impingement or pressure on the cervical nerve roots had been definitely established. Some were later diagnosed as osteoarthritis and cervical disk lesions.

17.	*Dislocations and subluxations*	1	

COMMENTS: As the primary concern of the physical therapist in these cases is injury to soft tissue, these injuries may be included under sprains and strains, muscle and tendon tears and ligamentous tears. In selected cases involving small joints, however, the physical therapist may be called upon to reduce subluxations.

18.	*Congenital anomalies of the back*	2	
19.	*Fibrositis*	4	
20.	*Ligamentous tears*	1	

COMMENTS: As in muscle and tendon tears, tearing was extensive and often required surgical repair.

21.	*De Quervain's Disease*	1, 3	?

COMMENTS: Etiology is questionable. This condition may be included under tenovaginitis but because of its rare occurrence, it is listed separately. Involvement is of the common sheath of the abductor pollicis longus and extensor pollicis brevis tendons.

22.	*Peripheral nerve injuries*	1	

Name of Condition	*No. of Cases*	*Class*	*Common Sites* (By regional anatomy in order of incidence)
23. *Cellulitis*		4	
24. *Rheumatoid arthritis*		2	
25. *Burns*		1	
26. *Meniscal tears*		1	
27. *Skin grafts*		1	(originally)
28. *Dupuytren's contracture*		?	
29. *Capsulitis*		1	

NOTE: Other conditions include cysts, ganglia and abscesses but the use of physical therapy in these cases is questionable except to aid healing following aspiration, excision or other measures.

* Indicates that, compared to other parts of the body, the number of cases is fairly high.

** Indicates that, compared to other parts of the body, the number of cases is exceptionally high.

GENERAL COMMENTS

1. It should be noted that the more severe injuries like fractures, amputations, and peripheral nerve injuries are either low in incidence or limited, for the most part, to small parts of the body.

2. It is not intended that this report be used as a guide in determining the incidence of traumatic conditions in other than the rubber industry. One might expect, however, that industries with higher frequency and severity rates would report a higher percentage of severe and extensive injuries and a lower percentage of minor injuries than is indicated here. On the other hand, one may expect the opposite to be true in industries having lower frequency and severity rates.

3. As might be expected, back injuries are much more common than injuries to other parts of the body. At this company approximately 30 per cent of the cases treated are injuries to the low back.

TREATMENT OF TRAUMATIC CONDITIONS

Space does not permit a discussion of all the various physical therapy treatment measures and combinations of these measures used in the treatment of traumatic conditions. It may be said in general, however, that the same measures employed in the hospital, rehabilitation center, and office of the orthopedist in the treatment of trauma and its residual effects are employed by an industrial physical therapy department. Of course, the extent to which these various measures are employed depends upon the need. At this company, for example, there is little equipment of the type used in the rehabilitation of the severely handicapped. The few cases that would benefit by the use of such equipment are sent to a nearby rehabilitation center. On the other hand, equipment and technics employed in the treatment of minor injuries are used extensively.

Ultrasound therapy—Of the more recently developed methods of physical treatment which may be used in the care of industrial injuries, ultrasound, as it is used alone, in combination with other physical therapy measures, or in combination with drug therapy, is probably of greatest therapeutic value. It is indicated and is either curative or offers symptomatic relief in many of the conditions listed.

That ultrasound may be used safely and more effectively when combined with other physical therapy measures than when used alone was investigated by Weiss and Behrend.[3] As a result of treating a large number of cases in which ultrasound was combined with massage, Sayre suspension, manipulative procedures, mechanical surface vibration, the low volt currents and mild forms of crymotherapy, they concluded that "these combined procedures have a synergistic, compatible and cumulative effect." In regard to dosage and the combined use of heat and ultrasound they made the following conclusions also: "The range of dosage which is therapeutic without untoward reaction is exceptionally broad. This is not true in the use of many forms of heat treatment. In minimal dosage, heat is capable of producing similar desirable effects, but the margin of this dosage is narrow. The tendency in

application of heat treatment in any of its numerous forms is usually toward too high an elevation of tissue temperature. It is for this reason that we have used heat sparingly in combination with ultrasound. When used, the method selected is usually hot packs." Aldes,[4] in his experiments with animals and later in his investigations of the combined use of hydrocortone acetate injection and ultrasound therapy in the treatment of articular conditions, considered the dispersion power of ultrasound. As a result of this investigation he concluded that ultrasound not only disperses hydrocortone effectively but that the combined use of these measures brings about more satisfactory results than when either is used alone. The best results were obtained in his treatment of chronic bursitis of the shoulder joints with calcareous deposits and capsulitis. Second best results occurred in patients who had hypertrophic or degenerative arthritis of the knee joint with synovitis. Third best results were with epicondylitis. Most rapid results were obtained in traumatic synovitis. For more detailed information concerning dosage and evaluation of results reference is made to Aldes' article.

Considering the advantages of using ultrasound in combination with other physical therapy measures and with drug therapy, ultrasound may be used effectively in combination with ion transfer, using various drugs. The polar effects of a galvanic current, the introduction of drugs into the tissues, the dispersion power and other beneficial effects of ultrasound are all used to advantage.

In our department, ultrasound has been used effectively in combination with ion transfer using magnesium sulfate (magnesium ions), sodium salicylate (salicylate ions), sodium chloride (chloride ions) and procaine hydrochloride (procaine ions). Although statistics establishing the effectiveness of these measures cannot be presented at this time, it is felt that thorough investigation of these measures is warranted for three reasons. First, the physiological basis for their combined use is sound. Secondly, as was mentioned previously, these measures may be administered without untoward effect. Thirdly, in the experience of this writer, results of treatment are so dramatic that further investigation is definitely indicated. In this regard, particular reference is made to the combined use of *magnesium sulfate ion transfer and ultrasound* in the treatment of sprains and strains, contusions and their residual effects, inflammation of soft tissue, and skin injuries. In these instances, treatment alleviates pain, reduces edema and hyperemia, and aids tissue healing. *Ion transfer with sodium salicylate followed by ultrasound* may be used in the treatment of osteoarthritis and other articular conditions to alleviate pain and reduce soft tissue swelling. In both of these combinations the alleviation of pain is often of long duration and, from every indication, there is a gradual and progressive subsidence of inflammation as treatments are continued. *Sodium chloride ion transfer followed by ultrasound* may be used to soften superficial scars, adhesions, and contractures. *Procaine hydrochloride ion transfer followed by ultrasound* effectively relieves pain in soft tissue injuries and inflammatory conditions of soft tissue thereby permitting passive and active movement. It is questionable, however, that there is any advantage in using these measures in preference to ethyl chloride spray in instances when local anesthesia followed by movement is indicated. In fact, considering that the latter procedure is less time consuming and easier to administrate, it is likely that it would be the treatment of choice.

Little need be said regarding the technic of administering ion transfer. In each instance above a 1 per cent solution of the drug was used. A current intensity of 1 milliampere per square inch of active electrode or less was employed depending upon the patient's tolerance. Immediately following 20 to 30 minutes of ion transfer, ultrasound was given over the affected area for 5 to 15 minutes depending upon the size of the area to be treated. Ultrasound intensities ranging from .5 to 1.5 watts/sq. centimeter were used, lower intensities being used for acute conditions and higher intensities being used for chronic conditions. Both the direct contact and underwater technics were employed and the sound head was kept in motion.

THERAPEUTIC EXERCISE

The industrial physical therapist deals mostly with the maintenance or restoration of joint and soft tissue function. Therapeutic exercise plays an important role, therefore, in the treatment of most traumatic and related conditions. Although immobilization of the injured part is often indicated, it is a rare occasion when such a measure is more than temporary. In fact, as we well know, the longer the period of immobilization the greater the need for mobilization.

Movements executed by a worker in the performance of his job are sometimes sufficient to maintain or restore function following a minor injury. That he is physically active is no assurance, however, that his activities are conducive to good functional recovery. Only by carefully

analyzing these activities from the standpoint of quality and quantity can their therapeutic value be determined. Often, it is necessary to either curtail certain of his activities or supplement them with prescribed exercise.

AIMS OF TREATMENT

The aims of physical therapy for industrial injuries are as follows:

In the treatment of temporary and partial disabilities

1. To aid healing, especially by increasing circulation
2. To alleviate pain
3. To reduce swelling
4. To maintain or restore muscle strength and bulk
5. To maintain or restore joint and soft tissue mobility by:
   a) Preventing adhesions and contractures
   b) Softening and stretching superficial scars and adhesions
   c) Stretching muscular and other soft tissue contractures
   d) Aiding in the absorption of calcium deposits
6. Whenever possible in postoperative and other conditions in which muscular strength may be impaired or lost through disuse or interference with nerve supply, to restore muscle coordination and function.

In the treatment of permanent, total disability

1. In any major amputation involving an extremity, to prepare the stump and remainder of the limb for a prosthesis and instruct the patient in the use of this artificial appliance.
2. In hemiplegia, paraplegia, or other severe paralysis, to rehabilitate the patient by teaching him to use uninvolved musculature and such supportive devices as canes, crutches, and braces to best advantage. To instruct the patient in self-care activities.

EMPLOYMENT POSSIBILITIES IN INDUSTRY

Considering the analysis of needs in industry for physical therapy, it would be expected that physical therapists would be in great demand. Yet, few therapists are employed in this field and, of greater significance, there seems to be little demand for their services. In periodicals on physical therapy, physical medicine, and industrial medicine few positions are listed for physical therapists in industry, and our professional organizations and medical employment bureaus have little information regarding such openings.

Although the shortage of physical therapists may account for the small number engaged in industrial work, there are other factors to be considered. It may be that many industrial physicians, having had little or no opportunity to employ physical therapy for industrial disabilities, must yet be convinced of its therapeutic value. It is logical to assume, too, that many physical therapists, having had little or no experience with industrial cases, are unfamiliar with the types of disabilities and needs in industry.

One of the purposes of this article has been to clarify some of these matters. In doing so, however, it becomes apparent that considerable time and effort on the part of our profession will be required to establish physical therapy as an integral part of industrial medicine. To make this task easier is the responsibility of those experienced in the field, those not employed by industry but who occasionally treat industrial cases, and our various physical therapy schools.

Physical therapists experienced in industrial work may help by:

1. Writing articles on methods and results of treatment,
2. Speaking to physical therapy groups and at meetings of industrial physicians.
3. Serving as consultants to company medical directors.

Those who occasionally treat industrial cases may help by:

1. Familiarizing themselves with technics best employed in the treatment of industrial injuries and
2. Recommending to physicians that these measures be prescribed. Particular reference is made to the treatment of minor injuries which, because of their seeming insignificance, are often neglected or treated inadequately. In the opinion of this writer, it is mainly in the treatment of these injuries, being high in incidence, that physical therapy will gain recognition in industry.

Our various physical therapy schools can accomplish much by:

1. Placing greater emphasis on the application of physical therapy to the treatment of industrial disabilities,
2. Arranging, wherever possible, to have students observe and practice at nearby com-

panies which have established physical therapy departments and trained personnel.

It is too soon for those who have assumed the responsibility of interesting high school and college students in physical therapy as a career to describe opportunities in industry. At such time, however, that physical therapy has assumed a more important role in industrial medicine and a greater number of positions are available, a career in industrial physical therapy should be made even more attractive.

The employment potential in industry is practically untapped. It is the responsibility of our profession, therefore, to consider ways to develop services in this area.

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Case Reports

Avulsion of a Finger with Protracted Disability

Margaret Knott, B.S.

Patient, J. C., a 29 year old male, was injured on Sept. 8, 1956, in an industrial plant. The tip of the patient's fourth finger, right hand, was caught between the chain and sprocket of a machine while he was cleaning it. At that time the patient was seen by the company doctors, none of whom felt the injury was serious. The tip of the fourth finger, right hand, was avulsed. Penicillin and a tetanus injection were given. On September 27, a company doctor again saw the patient and reported that the fourth finger was healing nicely, but that the second finger of the same hand showed some edema and was slightly flexed.

The patient returned to work on Oct. 2, 1956, and worked two days. He stated the finger hurt too badly, so he stopped.

On Oct. 15, 1956, he again reported to the company doctor. The doctor's examination revealed that the tip of the fourth finger, right hand, was very tender. The second and third fingers of the same hand were held partially flexed and the joints were swollen.

On Dec. 7, 1956, the patient was seen again by the same physician. His right hand was stiff and he was able to exert no grip with it. The right palm was sore to touch. At this examination the patient lacked a half inch of being able to touch his midpalm, but he could be forced into complete flexion easily. The doctor's note indicated that patient was not trying to use the involved hand at all. On Jan. 16, 1957, the patient was referred to the California Rehabilitation Center.

At the initial examination he had a grip of 90 pounds in the left hand; there was no grip measurable on the right. The patient did not even attempt to close his hand on the handle of the grip indicator.

The diagnosis was established on the basis of three possibilities: (1) unconscious alienation of muscle function; (2) conversion (hysterical) reaction; or, (3) conscious malingering for financial gain. The third, however, was less likely.

On Jan. 17, 1957, the patient was put on an exercise program using neuromuscular facilitation patterns. The procedures were explained to the patient by using the left uninvolved extremity to indicate what was expected of him. Emphasis was then placed on the right elbow and right shoulder patterns with little mention of the involved hand. When first doing the exercises the patient flexed his elbow and shoulder strongly each time; the fingers of the right hand were flexed passively by the physical therapist. The elbow and shoulder motions were resisted maximally. After the patient learned this procedure an attempt was made to prevent motion in the elbow and shoulder with the hope of getting overflow into the wrist and fingers. Pressure of the physical therapist's hand was always kept on the flexor side of the patient's fingers. After several repetitions of the procedure described, the patient began to flex his fingers actively. All resistance possible was applied to the finger flexors.

The patient was treated as above on January 17, 18, and 21. He was discharged on Jan. 21, 1957, with a grip of 85 pounds in his right hand and the original 90 pounds on the left. He had no symptoms except slight pain in flexing his fingers. He returned to work on Jan. 22, 1957, and has continued to work regularly since then.

Chief Physical Therapist, California Rehabilitation Center, Vallejo.

Suggestions from the Field

An Adapted Tilt-Table Device

Arthur J. Nelson, Jr., B.S.

PURPOSE

An adapted tilt-table was developed as an economic and space-saving method of giving physiological standing. It is particularly useful in that it saves time when giving a patient both physiological standing and a hydrotherapy treatment in the Hubbard tank.

DESCRIPTION

This device is applied to the standard pipe frame stretcher used to transfer patients into the Hubbard tank.

A piece of hardwood 19 by 8 by 1 inch is placed at a 90 degree angle to one end of the pipe frame stretcher. The wood is secured longitudinally on its edge by two strips of steel, 17 by ¾ by ⅛ inch. These two strips are formed into an elongated horseshoe. This flattened horseshoe is placed around the pipe frame and screwed to either side of the piece of wood. The metal is recessed on the side where the patient's feet will rest. The wood is held at the 90 degree angle by means of two small pieces of lightweight chain, 8 inches long. The chain is linked to the board by means of a 19 inch strip of steel (same material as used for the horseshoe), which has a hole on each end extending 1 inch from each end of the board. The other end of the chain is attached to the pipe frame by a U bolt, and secured 7½ inches from the board. (Fig. 1)

Two bifurcated stabilizing straps are placed at the level of the two lower holes in the stretcher canvas. These straps consist of double weight canvas 42 by 1½ inches. This 1½ inch strap is sewn and riveted to the center of a piece of canvas 3 inches wide. Buckles that will admit 1½ inch straps are sewn 1 inch from each end of the 3 inch piece of canvas. Sponge rubber pads, 4 by 6 inches, are applied to the 1½ inch strap by sewing two loops of cloth to the tops of the covering on the pads (Fig. 2).

United States Public Health Service Hospital, Staten Island, New York.

The 3 inch wide canvas strap with buckles on each end is passed beneath the canvas stretcher and around the pipe frame to facilitate the buckling of the 1½ inch strap across the anterior surface of the patient's thighs (Fig. 3).

The trunk is stabilized by a strap across the chest. This trunk stabilizing strap consists of a 52 inch piece of canvas strapping 3 inches wide. Buckles are sewn 1 inch from the end of the 3 inch strap. A 34 inch piece of 1½ inch canvas is sewn 25 inches from the other end of the 3 inch strip of canvas (Fig. 2). The completed stabilizing strap is placed with the buckle side down, across the top of the canvas stretcher. Each end of the stabilizing strap is placed through the ropes and around the pipe frame. Thus, the extending ends of the strap are buckled together across the patient's chest (Fig. 3).

If necessary, an abdominal support may be applied. This support consists of a 12 by 14 inch piece of light weight canvas, with a 1 inch strap sewn to each corner; each strap is 28 inches long. The almost square piece of canvas is placed over the patient's abdomen and the 4 straps are wrapped under the pipe frame and buckled with a hook type buckle. The hook type buckle is sewn to the opposite surface of the 12 by 14 inch piece of canvas (Fig. 3).

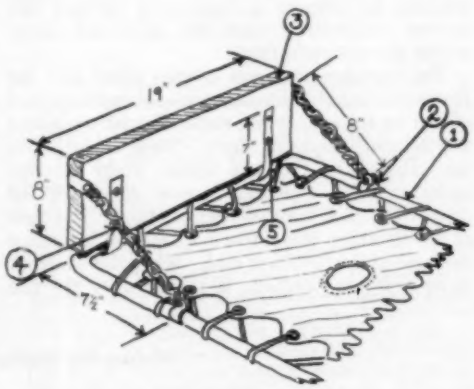

Figure 1. Footboard attached to stretcher.

1. Pipe frame
2. Chain clamp
3. Footboard
4. Metal chain
5. Horseshoe metal strip

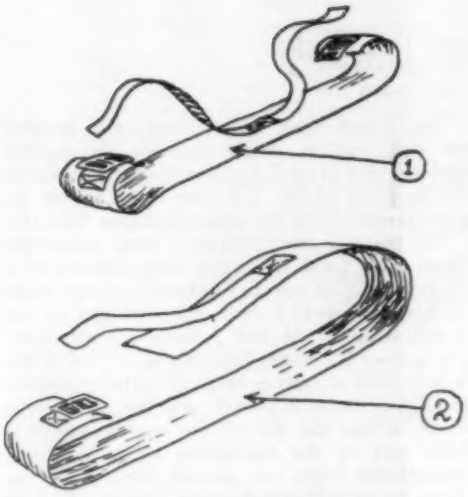

Figure 2. Stabilization straps.
1. Knee stabilizer strap
2. Chest stabilizer strap

METHOD

The stretcher is lifted on one end by two pieces of light weight cable 7 inches long which are secured on the standard lifting bar normally used to lift the stretcher. The other ends are clipped to the upper end of the stretcher with two heavy duty metal clips (Fig. 3).

When the patient is placed on the stretcher, the tendency toward outward rotation can be avoided by placing a towel roll beneath the greater trochanters and the 1½ inch strap across the patient's thigh.

The complete stretcher is then lifted into the Hubbard tank in the conventional manner and placed on the supporting rack. The lifting hooks are detached and the short 7 inch cable hooks are clipped to the two upper rings on the stretcher. The stretcher is now lifted off the supporting rack with the electric hoist. The foot of the stretcher is stabilized by resting it against the base of the Hubbard tank. When the stretcher is in a secure position, it is raised to the full erect position, or to whatever degree specified. If necessary, hand supports may be established by use of Loftstrand or standard crutches.

A hydrotherapy treatment may be given on the same stretcher by removing the canvas straps and folding the footboard forward, level with the canvas stretcher. The canvas straps can also be left in the water with little danger of shrinkage or other damage.

With some modifications this device can be used for stabilization when stretching a patient in the Hubbard tank.

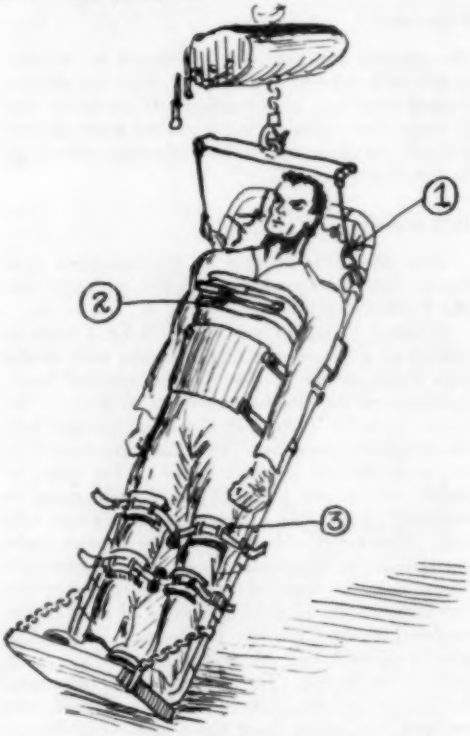

Figure 3. The adapted device lifted to a 45 degree angle.
1. Cable hook
2. Chest stabilizing strap
3. Bifurcated knee strap

Nebraska Licensure Examination

Examination for license to practice physical therapy in the State of Nebraska will be held on Thursday, September 11 at 8:00 A.M. in Room 1009, State Capitol Building, Lincoln, Nebraska. Application blanks and further information may be obtained by writing to:

State of Nebraska Department of Health
Bureau of Examining Boards
1009 State Capitol Building
Lincoln 9, Nebraska

Index to Current Literature

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Determination of the Heart Rate During Work. Carl Zenz and Frank Mounts, A.M.A. Arch. Indust. Health, 17: 280-286, April 1958

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ELECTROTHERAPY

Effects of Delayed Electric Stimulation on Experimentally Denervated Muscle. Khalil G. Wakim, Arch. Phys. M., 39: 232-234, April 1958

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Prognosis and Treatment of Multiple Sclerosis—Quantitative Nosometric Study. L. Alexander, A. W. Berkeley and A. Alexander, J. Am. M. Ass., 166: 1943-1949, April 19, 1958

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The Neuropathies of Diabetes. John F. Sullivan, Neurology, 8: 243-249, April 1958

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The Reticular Core—1957. James L. O'Leary and Lawrence A. Coben, Physiol. Rev., 38: 243-276, April 1958

The Depression of the Receptor Potential in Pacinian Corpuscles. J. Diamond, J. A. B. Gray and D. R. Inman, J. Physiol., Lond., 141: 117-131, April 3, 1958

The Reticular Formation of the Brain. Esther M. Greisheimer, J. Am. M. Women Ass., 13: 121-125, April 1958

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Follow-Up Studies in Chemopallidectomy for Paralysis Agitans. M. Riklan and L. Diller, J. Am. M. Ass., 167: 13-17, May 3, 1958

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A Method of Attempting to Prevent Increasing Paralytic Spinal Curvature in the Growing Child. Ray A. Haag, Arch. Phys. M., 39: 241-244, April 1958

Colles' Fractures. E. Geckeler and D. Gross, Pennsylvania M. J., 61: 486-488, April 1958

Fundamentals of the Scoliosis Problem for the General Practitioner. J. H. Moe, Postgrad. M., 23: 518-532, May 1958

Methods and Results in the Treatment of 2,580 Painful Shoulders with Special Reference to Calcific Tendinitis and the Frozen Shoulder. Paul H. Harmon, Am. J. Surg., 95: 527-544, April 1958

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Pathophysiological Considerations following Medial Meniscectomy. Elles C. West, Am. J. Phys. M., 37: 61-74, April 1958

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Flexion Spasms and Contractures in Spinal-Cord Disease. G. Platt, W. R. Russell and R. G. Willison, Lancet, Lond., 1: 757-760, April 12, 1958

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Vaccination Against Poliomyelitis. Lewis L. Coriell, A. M. A. J. Dis. Child., 95: 349-358, April 1958

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Rehabilitation Nurse. Harriet C. Lane, J. Rehabil., 24: 11-15, March-April 1958

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(continued on page 566)

Editorial

Program for the Foreign Trained

As a member organization of the World Confederation for Physical Therapy, the American Physical Therapy Association has reaffirmed its responsibilities as a professional organization in understanding common problems and mutual interests in the development of international good will. Since its early years the Association has had a program for assisting the physical therapist with professional status in certain countries outside of the United States in gaining professional affiliation with the American Physical Therapy Association. Several on-going committees appointed by the Board of Directors have been concerned with study and recommendations regarding the professional education and experience of physical therapists from foreign countries. Policies and procedures have been developed as interchange of information and understanding of relative equivalency in professional preparation were obtained. In addition there has been increased awareness and knowledge of the leadership assumed by other professional groups in developing their own equivalency programs.

The use by other agencies of the American Physical Therapy Association as a resource in determining professional competence and assisting in planning for learning experiences for foreign visitors has required interpretation of standards and regulations regarding acceptable professional education, practices, and ethical conduct.

All of these have led to the necessity for further clarification and refinement of the Association's program.

Courtesies and privileges can be extended to physical therapists from foreign countries by the American Physical Therapy Association if certain qualifications are met. This program is based on the preprofessional and professional credentials of the candidate as well as on the evaluation of present performance and affiliations. In addition to other regulations, candidates for these services must present certification of their educational background and professional status in one of the member organizations of the World Confederation for Physical Therapy.

The type of visa to be used in entering the United States will determine the program which can be planned for the foreign trained physical therapist in line with his expressed purposes in coming to this country.

Editorial

The physical therapist who enters on an immigration visa signifies his intent to make the United States his permanent residence and will be expected to adapt to the professional standards and laws of the land as they relate to the professional practices under medical direction in patient care.

Guidance will be given the new arrival in selecting his first work situation in a location which will assure supervision and guidance by an American Physical Therapy Association member and an introduction to chapter activities. This provides the opportunity of becoming familiar with American philosophies, methods and inter-relationships as well as study and review in preparation for a comprehensive examination. Membership gained in this manner assures relative competence of the foreign trained physical therapist.

Anticipating a limited stay, the physical therapist entering on an exchange-visitor visa must have his assignments preplanned to provide a learning experience in the sharing, adopting, and improving of skills and performance required in service to patients.

The American Physical Therapy Association has an exchange-visitor program number under which it may function in making plans for physical therapists from some countries. In addition it provides advisory service in planning for physical therapists sponsored by other agencies with international interests who are conducting an exchange-visitor program.

The American Physical Therapy Association member who is called upon for interpretation of functions and services, assistance with study, and evaluation of the candidate's performance assumes a major role in the successful administration of this program. It is with the support of its members that the American Physical Therapy Association can assume leadership in furthering international understanding and good will for effective patient care for handicapped people around the world as well as maintaining standards in our own country.

LUCY BLAIR
Associate Executive Director

American Hospital Association–American Physical Therapy Association Institute for Physical Therapists

The next Institute for Physical Therapists co-sponsored by the American Hospital Association and the American Physical Therapy Association will be held at the Bellerive Hotel, Kansas City, Missouri.

The Institute Planning Committee composed of members of the Western Missouri and Kansas Chapters of the American Physical Therapy Association is already hard at work and has met with representatives of the American Hospital Association to plan an informative and interesting Institute. Program details will be sent later, but plan now to attend and reserve the dates of Nov. 10–14, 1958.

Association News

PATRICIA M. BAUCHLE

New Recruitment Consultant

Patricia M. Bauchle joined the National Office staff on May 1, 1958, replacing Edna Goldwater who is now with the National Association of Social Workers. Mrs. Bauchle, a graduate of the University of Minnesota, received the master of science degree in Retailing and Personnel Administration from New York University.

Volunteer service with such organizations as the Grey Lady Corps; American Red Cross; Greater New York Council for Foreign Students; Permanent Committee for the Prevention of Juvenile Delinquency; and New York State Civil Defense has enriched Mrs. Bauchle's experience.

For the past five years Mrs. Bauchle has devoted her efforts to public relations, publicity, sales promotion, and community organization. She has held positions with the Camp Fire Girls, Richland, Washington; Davis and Clifton, Real Estate Brokers, Burlingame, California; Fox and Carskadon, Real Estate Brokers, San Mateo, California; and has done free lance work in sales promotion on the West Coast and in New York City.

Serving the Association through the Department of Professional Education, Mrs. Bauchle will assist chapter and district recruitment chairmen with planning their recruitment projects and public relations activities.

Marriages

Gertrude Brandstadt, of Avon, Ohio, to K. N. Sutton, Elyria, Ohio.
Jo Ann Browning, of Forest Park, Ill., now Mrs. Jo Ann B. Davis, Herrin, Ill.
Olga T. Burns, of San Angelo, Texas, to Capt. P. J. Dugan, A.P.O. New York.
Elizabeth A. Chapman, of Richmond, Va. to Hayden A. Ross-Clunis, Jr., Los Angeles, Calif.
Carolyn M. Checkley, of New York, N. Y., to William M. Napolitano, Wright-Patterson AFB, Ohio.
Ernestine Collins, of Flint, Mich., now Mrs. Ernestine C. Smith, Flint.
Doris Davis, of New Orleans, La., to Louis E. Miller, New Orleans.
Margaret Jock, of Detroit, Mich., to Paul Ahlness, Wayne, Mich.
Margaret Koob, of Oakland, Calif., to Alan Hungerford, Cincinnati, Ohio.
Esther J. Lanto, of Grand Rapids, Minn., now Mrs. Esther L. Tufvesson, Jackson, Minn.
Sally A. Mammen, of Vandalia, Ill., to James L. Miller, Vandalia.
Myrna Serotick, of Jamaica Estates, N. Y., to Daniel Brown, Hollis, N. Y.
Elaine Stanton, of Columbus, Ohio, to Dwight Holt, Marion, Ohio.

Chapter News

Delaware

At the May meeting, the members of the Delaware Chapter enjoyed a talk given by Howard Wise, Coordinator of Remedial Physical Education at Wilmington High School. Mr. Wise discussed a program introduced to the Wilmington schools within the past year which provides especially adapted classes taught by appropriately trained personnel for students formerly excused from physical education or having a specific problem, orthopedic or postural. Mr. Wise stressed the need for such a program in the public schools and stated that because of their interest and education, physical therapists are well qualified to fill positions in such programs.

National Office Statistical Reports....

Department of Chapters and Membership

Membership Report—1957-58

Membership:	May, 1, 1957	May 1, 1958
Active	5,336	5,692
Inactive	1,568	1,765
Association	45	42
Honorary	8	8
Life	58	65
Student	983	985
Total	7,998	8,557

New members:		
Active	733*	
Associate	1	
Student	739	
		1,473
Reinstatements:		
Active	51	
Inactive	3	
		54
Transfers:		
Active to Inactive	335	
Inactive to Active	79	
Active to Life	6	
Inactive to Life	5	
Resignations:		
Active	43	
Inactive	24	
Associate	2	
		69
Deceased:		
Active	8	
Inactive	3	
Life	4	
		15
Dropped for non-payment of dues:		
Active	115	
Inactive	51	
Associate	2	
		168

* Includes 52 who were not recent graduates and 17 foreign trained.

The following members passed away during the year 1957-58:

Mathea Boxeth	Goldie Harding
Olena Cole	Helen Landon
Grace Courter	Jeanne Linquist
Cecelia Cummins	Anita Lowenstein
Cecile Fisher	Birdean Richmond
Elma Lee Georg	Sylvia Stroehlein
Martha Gill	Etta Underwood

Constance Wipper

Foreign Trained

I. Accepted as active members 17

Supervised experience and examination (1957-1958) 16

(3 by licensure examination of Professional Examination Service, American Public Health Association; Administered by North Carolina and Nevada)

Supervised experience and examination (1956-1957) 1

Country of origin

Canada	2	Great Britain	11
Denmark	1	Norway	2
Sweden	1		

II. Candidates examined 21

Passed—15 (71.5 per cent)

Canada	2	Great Britain	9
Denmark	1	Norway	2
Sweden	1		

Failed—6 (28.5 per cent)

Denmark	1	Germany	3
Sweden	2		

NOTE—See additional information in report of the Department of Professional Services regarding physical therapists from foreign countries who did not complete requirements for membership.

Field Service—1957-58

During the year consultants from the National Office visited chapters, districts, or chapter executive committees as follows:

Alabama
Connecticut
District of Columbia
Illinois
Kansas
  Northeastern District
Kentucky
Massachusetts
  Western District
Minnesota
Eastern Missouri
Western Missouri
New York
  Greater New York District
Ohio
  Northeastern District
Pennsylvania
Tennessee
  Western District
Washington State

Chapter Representation

The following chapters are represented on the Board of Directors and national committees, or have members serving as section officers and Association representatives:

Northern California
Southern California
Colorado
Connecticut
Delaware
District of Columbia
Idaho
Illinois
Indiana
Iowa
Kentucky
Massachusetts
Michigan
Minnesota
Western Missouri
Nebraska
New York
North Carolina
Ohio
Oklahoma
Pennsylvania
Texas
Utah
Vermont
Virginia
Washington
Wisconsin

1956-57: 25 Chapters
1957-58: 27 Chapters

Chapter News in *Physical Therapy Review*

Chapter news items were submitted through chapter or district newsletters and correspondence as follows:

Northern California
  San Jose District
Southern California
Colorado
Connecticut
Georgia
Illinois
Iowa
Kentucky
Louisiana
Massachusetts
Minnesota
Michigan
  Eastern District
  Western District
New Jersey
New York
  Greater New York District
North Carolina
Ohio
Oklahoma
Oregon
Pennsylvania
  Eastern District
  Western District
Tennessee
Texas
  Southeastern District
Vermont
Washington State
  Eastern District
Wisconsin
Wyoming

1956-57: 26 chapters and districts
1957-58: 33 chapters and districts

Chapter Bulletins

In addition to correspondence with chapter and district officers, bulletins containing information on Association activities and guidance to chapters and districts were sent from the National Office in August, 1957, and January and March, 1958. Special subjects presented with chapter bulletins or as separate memos included:

Program Development—Writing for Physical Therapists;
  Extension of APTA-OVR 1957 Institute to chapter and district programs.
Analysis of Administration of State Laws—reciprocity and endorsement features;
  Number of members practicing legally; registration or licensure of foreign trained.
Legislative Activities—states without laws
Potential Members
Chapter Exhibits and Chapter Workshops—Annual Conference
Chapter Treasurer's Annual Report
Meeting of Physical Therapy State Examining Boards and Committees

Physical Therapy Review

Circulation and Advertising Report —1957-58

Total Circulation	1956-57	1957-58
Members	6,444	6,839
Nonmembers	1,518	1,653
Total	7,962	8,492
Increase in Circulation	530	

Advertising

Pages of space advertising	187	167.5
Pages of classified advertising	24	27.75
Increase in classified advertising		3.75

Special Issues 1957-58
  June 1957—Conference Issue
  April 1958—Education Issue

The *Review* goes to the following 68 foreign countries:

Algeria	1	Japan	5
Argentina	7	Jordan	1
Australia	51	Korea	2
Austria	2	Lebanon	1
Belgium	21	Liberia	1
Bermuda	1	Malaya	2
Brazil	10	Mexico	13
British E. Africa	1	Netherlands	12
Burma	2	New Zealand	4
Canada	90	Nigeria	1
Canal Zone	5	Northern Ireland	1
Canary Islands	1	Norway	24
Chile	3	Pakistan	4
Colombia	7	Peru	1
Cuba	9	Philippines	3
Curacao	1	Poland	6
Czechoslovakia	2	Portugal	1
Denmark	17	Romania	2
England	29	Saudi Arabia	2
Finland	6	Scotland	1
France	14	Spain	2
Germany	7	Sweden	15
Greece	4	Switzerland	32
Guatemala	2	Thailand	4
Haiti	1	Trinidad	3
Hong Kong	1	Turkey	1
Hungary	2	Uganda	1
Iceland	1	Union S. Africa	15
India	11	U.S.S.R.	7
Iran	2	Uruguay	2
Ireland, Republic of	1	Venezuela	2
Israel	18	Yugoslavia	3
Italy	18	Wales	2
Jamaica	1	*W. Caroline Is.	1

1957-58	526
1956-57	494
Increase	32

* Protectorate.

Department of Professional Services—1957-58

Placement Service

Service to APTA members

174 Active on Placement Service on April 30, 1958
224 Removed upon written report that location had been satisfied
398 Total receiving assistance

Service to prospective employers (hospitals, clinics, etc.)

380 Currently active
35 Pending additional information for activation
485 Closed following written notification that position had been filled
900 Total receiving assistance
This includes service to facilities in 14 foreign countries

Poliomyelitis Assignment Service

6 Physical therapists were on temporary polio asignments on May 1, 1957.
4 Assignments of physical therapists for temporary duty during polio emergencies were made to North Carolina and Texas.
1 Assignment cancelled before reporting for duty.
10 Assignments were terminated as the emergency situation lessened.
None were on temporary polio assignments on April 30, 1958.

Foreign Trained Physical Therapists

A. Entering the United States on an immigration visa:

61 Meeting requirements for membership with the APTA on a probationary status.
53 Pending employment or payment of fees.
11 Plans changed; did not arrive in the United States.
13 Remaining in the United States but did not complete original plans.
7 Left the United States without completing original agreement.
145 Total receiving assistance.

B. Entering on an Exchange-Visitor visa:

37 Receiving experience on traineeship basis.
26 Pending arrangements for traineeship.
13 Plans changed; did not arrive in the United States.
1 Remaining in United States but did not complete original plans.
1 Left United States without completing original agreement.
21 Completed traineeship and left the United States.
99 Total receiving assistance.

C. Entering on a Visitor's visa:

11 Completed observation visits in the United States.
4 Planning observation visits in the United States.
4 Plan changed; did not arrive in the United States.
3 Making observation visits at the present time.
22 Total receiving assistance.
266 Grand Total

Representing physical therapists from 14 countries.

Clinical Facilities Visited

By states and listing cities and number of facilities visited

*Alabama
Birmingham 4
Montgomery 5
California
Hondo 1
Los Angeles 5
Delaware
Wilmington 1
District of Columbia 3
Kansas
Hutchinson 2
Independence 2
Kansas City 2
Leavenworth 1
Newton 4
Wichita 5
Winfield 2
*Kentucky
Louisville 10
*Massachusetts
Boston 4
Greenfield 1
*Minnesota
Minneapolis 3
*Missouri
Kansas City 13
St. Louis 3
New Jersey
Far Hills 1
Flemington 1
Morristown 3
Peapack 1
New York
Brooklyn 1
New York 2
North Carolina
Asheville 2
Chapel Hill 2
Charlotte 4
Durham 4
Fayetteville 3
Gastonia 1
Greensboro 3
Henderson 1
Morganton 1
Oteen 1
Raleigh 3
Salisbury 2
Wilmington 1
Wilson 2
Winston-Salem 3
Ohio
Cleveland 13
Pennsylvania
Philadelphia 12
Uniontown 1
Rhode Island
Providence 2
*Tennessee
Madison 1
Memphis 7
Nashville 3
*Washington
Seattle 8

TOTAL 16 states and District of Columbia

47 cities

160 facilities

* Cooperation in clinical visits provided by Consultant in Chapter and Membership Department.

Department of Professional Education—1957-58

ADVISORY SERVICES

A. Education for Physical Therapy—Field visits to seven approved schools and one developing program; survey visits to two with representative of Council on Medical Education and Hospitals (AMA); correspondence with 14—inquiries concerning curricula.

B. Career guidance; recruitment.

C. Teachers, prospective teachers.

MEETINGS

A. APTA Committees, Meetings: Advisory Committee to the Department of Professional Education—2; Film Advisory Committee; Committee to Study the Preparation of the Foreign Trained Physical Therapist—2; APTA-OVR Institute Committee; APTA Board of Directors; Physical Therapy Fund, Inc. (Members Meeting); UCP Scholarship Committee—3.

B. Committee meetings of other organizations:—NFIP Scholarship Committee—3; Public Relations Society of America; Council of Physical Therapy School Directors; Advisory Committee on Physical Therapy Education, AMA Council—2; Eastern School Directors; Advisory Panel on Physical Therapy—OVR; American Personnel and Guidance Association; Semiannual State Conference of UCP Associations of New York State, Professional Personnel Recruitment Committee of UCP Associations of New York State.

SPECIAL PROJECTS

Strong Vocational Interest Study; second revision of the licensing examination; 1958 APTA-OVR Institute; 1957 APTA-OVR Institute Manual; talks to three student groups, monthly bulletins to the schools of physical therapy; three grant requests submitted; revision of vocational guidance manual for counselors, teachers, librarians, career exhibit for American Personnel and Guidance Association Annual Conference; preparation of organizational manual covering 1957 APTA-OVR Institute Committee and for report to OVR; editorial on continuing education for *Physical Therapy Review*; evaluation survey of members at 1957 APTA Annual Conference for 1958 planning; Advisor for Section on Physical Therapy in the College Blue Book.

STATISTICAL REPORTS

A. Student Enrollment in Currently Approved Schools—1957

	1955	*1956*	*1957*
Total Students in final year Certificate and Senior	742	800	808

NOTE: The 1957 Enrollment shows a 38 per cent increase over that of 1952.

B. Guidance Information

	Responses Form Letters	Personal Letters	Office Interviews
Prospective students	5949	345	35
Vocational guidance counselors	4786	105	
Postgraduate study		46	12
Foreign trained		19	8
Employment non-P.T. (camp, aides, volunteers, etc.)		109	

C. Scholarship Activities
   1. United Cerebral Palsy Fund (awards in amounts of tuition only)—21 awards averaging $395.95 each; 58 applications considered.
   2. Revision of "Sources of Financial Assistance for Physical Therapy Students"—521 agencies surveyed; 18 national agencies listed; 35 states and territories represented.

D. Graduate Study
   1. Short term courses: 14 surveyed; 23 publicized in *Review* a total of 114 times; 68 physical therapists referred to NFIP Teaching Fellowship Program.

E. Teacher Recruitment: 412 names of physical therapists expressing interest in teaching on file (322 former and 90 new listings); 49 briefs on physical therapists sent to schools; data on openings sent to 434 physical therapists; 10 teachers placed: currently 11 vacancies in existing schools and 5 in prospective schools.

F. Teaching Aids

   Film data sheets sent monthly to faculties of 37 AMA approved schools and 2 prospective schools; to 21 members responsible for chapter programs and in-service training programs; and to 42 members requesting film information on specific subjects.

G. Handling of recruitment materials in the national office of the APTA.
   A. Printed materials distributed
      1956-57: 387,751 1957-58: 331,223
   B. Number of requests received
      1956-57: 10,088 1957-58: 9,648
   C. Film showings: approximately 100 inquiries referred to local APTA custodians and 65 referred to film service company.

Major Barbara M. Robertson Named Assistant Chief of Army Medical Specialist Corps

Major Barbara M. Robertson, AMSC, has been appointed Assistant Chief of the Army Medical Specialist Corps and Chief of the Physical Therapist Section of the Corps, effective Sept. 1, 1958.

Major Robertson will succeed Lt. Col. Agnes P. Snyder, who will go to the Army Medical Service School, Fort Sam Houston, Texas, to become the Director of the Course in Physical Therapy at the School.

MAJOR BARBARA M. ROBERTSON

For the past five years, Major Robertson has been Director of the Course in Physical Therapy at the Army Medical Service School.

A native of Tacoma, Washington, Major Robertson graduated from the State College of Washington at Pullman in 1933 with a bachelor of science degree in physical education. She attended the course in physical therapy at Walter Reed Army Hospital, Washington, D.C., in 1936-1937, and took her master of science degree at the University of Colorado Medical School in Denver in 1951.

Major Robertson has served as a physical therapist with the Army Medical Service since 1937, in various hospitals throughout the United States. During World War II she served three years in the Pacific Theater of Operations.

Throughout her career Major Robertson has been active in the local and national activities of the American Physical Therapy Association and at the present is serving as secretary of the Texas Chapter and as Assistant Editor of the *Physical Therapy Review*.

New Student Members

Boston University
Eleanor M. Brumsted
University of Buffalo
Ruth E. Baines
University of Connecticut
Marilyn A. Koval — Verna M. Morrell
Judith A. Mitchell — Jacqueline D. Smith
Nancy J. Wilson
University of Southern California
Mary M. Rodda
University of Wisconsin
Miriam A. Safer

Student Column

The Use of Cold Packs for Increasing Joint Range of Motion—A Study

Lois E. Rockefeller, 2nd Lt. AMSC

When five physical therapy students* arrived at Letterman Army Hospital for their clinical affiliation, they were surprised to note the frequency with which cold, wet towels were administered to sore, stiff joints. Most of these treatments included exercise of varying degrees. Joint range of motion limited by pain was increased by local cold applications, but there was no statistical data to alleviate the subjectivity of this observation nor to prove whether cold packs alone or cold packs and exercise were more beneficial.

Therefore, throughout the months of June, July, and August, 1957, the students carried out a study to investigate further the application of cold as a therapeutic agent.

The literature was reviewed to learn what effects cold has on the body. This review will not be presented here, except for some findings particularly pertinent to the study. Malcolm and Douglas have found that cold blocks nervous conduction and that susceptibility to cold blocks is related to the size of the individual nerve fiber. The order of susceptibility is first in small medullated fibers, then the large medullated fibers, and last in the unmedullated fibers. Pain fibers consist of small medullated and unmedullated fibers. The immediate reaction of the body to cold causes a diminished reflex activity, a relaxation of the muscles in the area where cold has been applied, and a sensation of warmth. Much is still controversial and unknown about the exact reaction of the body to short applications of cold, but the belief that pain will be decreased and joint range of motion increased with cold applications or with cold and exercise seems justified from the available information.

The patients included in this study had pain that limited range of motion in a joint. Patients with upper motor neuron involvement, radiologically abnormal joints, or contractions were excluded. Cold treatments were continued daily until symptoms improved or until it was obvious that other treatment was indicated.

The patients were divided into two groups for a comparison between the effect of cold packs alone and cold packs plus exercise. Patients who started treatment on the odd days of the month were placed in Group A and received cold packs as the only treatment. Patients starting on even days were placed in Group B and were treated with cold packs and exercise.

The routine for the treatment was as follows:

1. The range of motion of the affected joint was measured each day before treatment and recorded on a special form.

2. Towels immersed in a bucket of ice cubes and water were gently wrung and applied to the affected area for one minute intervals with 8 changes of towels. The temperature of the water remained a constant 34°F. Two towels were used for each area treated so that one was soaking in the ice water until the moment it replaced the pack on the patient.

3. The range of motion was taken and recorded after each treatment.

4. Group B was started on exercise after the fourth application was completed. Exercise continued throughout the remainder of the cold applications and often beyond. Exercise was active only, with the exception of proprioceptive neuromuscular technic for low back pain. Range of motion was measured after treatment.

In order to minimize the margin of error, the same physical therapist did all joint measurements on a given patient when possible. Pertinent variables were recorded including concurrent medication which, in the final tabulation, did not show any correlation with the relief of pain.

At the completion of the study 39 patients had been treated, with an average of 7.3 treatments for each patient. Fifteen patients returned for goniometric rechecks several weeks after treatment had been discontinued.

For tabulation of data, the only two joint classifications recorded in sufficient numbers to be significant were the cervical and low back disabilities. The final study was thus limited to a total of 24 patients.

Student Therapist, Letterman Army Hospital, San Francisco, California.

* Second Lieutenants Stella Alston, Joyce McDowell, Mary C. Talbut, Bertha C. Williams.

TABLE 1

Comparison of cold packs and cold packs plus exercise in treatment of painful motion

MOTION	BACK FLEX		NECK FLEX		NECK EXT.		NECK RIGHT ROT.		NECK LEFT ROT.	
GROUP*	A	B	A	B	A	B	A	B	A	B
Average daily change	+1.34"	+1.85"	+6.1°	+9.0°	+6.6°	+9.3°	+4.0°	+4.8°	+9.6°	+3.8°
Average change from one treatment to next	+0.56"	-1.18"	+0.6°	+2.7°	-6.1°	-5.2°	+1.3°	+0.03°	-1.4°	+1.3°
Difference between initial and final R.O.M.	+9.34"	+5.84"	+11.0°	+21.3°	+5.8°	+14.7°	+16.3°	+15.7°	+25.8°	+16.0°

* Group A treated with cold packs alone, Group B with cold packs plus exercise.

An attempt was made to compare the results of cold pack treatment versus cold packs and exercises through the following tabulations with each joint motion.

1. The average daily change in range of motion for any one treatment period
2. The average change of motion from the end of one treatment to the beginning of the next
3. The difference between the average initial and the average final range of motion

Calculation of the average daily change in range of motion was accomplished by adding the individual increases or decreases for the first and for successive treatment days and dividing the total by the number of patients and the number of treatments for each patient. The number of treatment periods significant in each group before patients started dropping out or before changes in measurement became negligible was determined from such data. Three treatment periods proved sufficient for the study of necks and seven for backs. The average daily change of Groups A and B could be compared to show a difference in the immediate effect of either treatment. The backdrop or gain from one treatment to the next was similarly calculated providing averages for each day and for the total number of days. The differences between the average initial and final ranges of motion in each motion of the necks and backs were compared in Group A and B to show whether cold packs or cold packs and exercise provided a greater increase during total treatment.

The detailed results of this study are shown in table I. Results of the tabulations of the average daily change showed an over-all greater increase in Group B than in Group A. For example, with 4 patients in each group of neck ailments, comparison of the average daily change in neck flexion showed that Group A, cold packs alone, gained an average of 6.1° for each treatment, whereas Group B gained an average of 9°.

In similar tabulation of back flexion, the change in range of motion was measured in the number of inches the patients' fingertips were from the floor when bending forward at the waist. The B Group of 9 patients again showed a higher daily increase of about ½ inch as compared to the 7 patients in Group A.

The average change in trunk flexion from one treatment to the next presented a greater loss in the B Group of backs than in the A Group. In the various neck motions Group B was better than the A Group in all but right rotation.

The comparison of differences between the initial and final ranges of motion in the A and B Groups were compared. The total improvements of the patients appeared to show no definite pattern with regard to the use of cold packs or cold packs and exercise.

Along with an increase in range of motion following cold treatments, most of the patients reported decrease in pain or became pain free. This was true whether or not medication was given. About three fourths of the patients received medication, but in the majority of cases this consisted merely of salicylates.

CONCLUSIONS AND SUMMARY

The conclusions made from this limited study are as follows:

1. Joint range of motion which has been limited by pain can be increased with local application of cold.

2. There is a greater increase in range of motion during each treatment when the patient receives cold packs and exercise.

3. With over-all increase of motion and decreased pain as the criteria in this study, cold packs alone seemed to be the more beneficial treatment for low back pain with limitation of motion. This was also true of right and left rotation of the neck. Cold packs plus exercise produced more favorable results in flexion and extension of the neck (Table I). Due to the extremely small series studied these apparent variations may not be valid and further study is necessary.

4. Relief of pain was approximately equal in both groups. Medication did not seem to make a significant difference in the results.

This study was made in an attempt to determine if joint range of motion limited by pain is benefited by applications of cold, and the extent to which exercise as a part of the treatment might further affect the range of motion. It is felt that this work is only a beginning and that more study of many more patients must be done before it can be determined just how beneficial cold treatments are, whether exercise is a valuable adjunct to them, and whether one joint or diagnosis responds better to cold treatment than another. It is hoped that therapists in other medical installations will extend this study and provide additional information on cold therapy in physical therapy.

Polio Protection for Infants

According to Dr. Thomas M. Rivers, medical director of the National Foundation for Infantile Paralysis, children as young as 2 or 3 months should have their first shot of Salk vaccine, which can be given at the same time as protection against whooping cough usually given at this age.

"Recent studies indicate that polio vaccine given simultaneously with other vaccines for infants provides safe, effective immunity," Dr. Rivers said in an article in the May issue of the *National Foundation News*. "Thus, protection against paralytic polio can be started early in life and mothers and doctors can be saved the inconvenience of extra visits for polio shots.

"Doctors usually start 2 and 3 month old babies on DPT, a triple vaccine against diptheria, pertussis (whooping cough) and tetanus," he said, "because whooping cough can kill the very young. Smallpox vaccination is often delayed to save the baby discomfort. Since the Salk vaccine is a mild injection with no ill effects, there is no reason to delay polio protection."

Paralytic polio in the very young, though relatively rare, Dr. Rivers pointed out, is particularly tragic because a severe attack may result in a whole life scarred by this crippling disease. He cited the case of an unvaccinated 18 week old baby boy in Houston, Tex., who was stricken with polio in February and is now in an iron lung.

Dr. Rivers based his recommendation on two independent studies by National Foundation grantees. Safe, effective vaccination of 2 month old infants with Salk vaccine in one arm and DPT in the other arm has been reported by Dr. Gordon C. Brown, Professor of Epidemiology at the University of Michigan. Dr. Brown's research has been substantiated at the Vanderbilt Well Baby Clinic, Nashville, Tennessee, by Dr. Randolph Batson, Dr. Amos Christie, Dr. Bertha Mazur, and Jewell H. Barrick.

Dr. Rivers advised that immunizations during baby's first year follow the schedule suggested by the American Academy of Pediatrics. Accordingly, infants of 2 months can be given their first DPT shot and at the same time their first Salk shot. During their third month, infants can be given their second DPT shot and their second Salk shot. The third DPT shot is given at 4 months; smallpox vaccination is given at 6 months, and the third polio shot at 10 months.

Index to Current Literature

(*continued from page* 555)

ULTRASOUND

Effect of Metallic Objects on Temperature Rises Produced in Tissues by Ultrasound. Jerome W. Gersten, Am. J. Phys. M., 37: 75-82, April 1958

MISCELLANEOUS

Changing Dimensions of Medical Knowledge. Hugh Hussey, J. Am. M. Ass., 167: 40-47, May 31, 1958

Paraffin Bath as Thermotherapy—an Evaluation. C. W. Stimson, G. B. Rose and P. A. Nelson, Arch. Phys. M., 39: 219-227, April 1958

You Know What You Mean—But Who Else Does? S. G. Hill, Mod. Hosp., 90: 51-54, May 1958

Physical Therapy Programs

APPROVED BY THE COUNCIL ON MEDICAL EDUCATION AND HOSPITALS OF THE AMERICAN MEDICAL ASSOCIATION

Schools offering the four year program leading to a baccalaureate degree accept high school graduates and transfer students. Schools offering the 12 to 16 months' program leading to a certificate accept students who have completed all or most of their undergraduate work providing they meet certain course requirements. Recipients of a degree and/or certificate have equal professional status. For specific information regarding each school's entrance requirements, curriculum, tuition and other fees, write to the physical therapy director indicated below. All students should investigate course requirements *early*.

	Degree	*Certificate*
CALIFORNIA		
Mary J. Dodge School of Physical Therapy Childrens Hospital Society 4614 Sunset Boulevard Los Angeles 27	‡	†
Ronald A. Hershey School of Physical Therapy College of Medical Evangelists Loma Linda	†	†
Lucille Daniels Division of Physical Therapy Stanford University Stanford (Palo Alto)	†	†
Margery L. Wagner Curriculum in Physical Therapy University of California The Medical Center San Francisco 22	†	†
Charlotte W. Anderson Department of Physical Therapy University of Southern California Los Angeles 7	†	†
COLORADO		
Dorothy Hoag Curriculum in Physical Therapy University of Colorado Medical School Denver 20	†	†
CONNECTICUT		
James M. Bauer Acting Director School of Physical Therapy U 101 University of Connecticut Storrs	†	
ILLINOIS		
Elizabeth C. Wood Course in Physical Therapy Northwestern University Medical School 303 East Chicago Avenue Chicago 11	†	†
IOWA		
Olive C. Farr Physical Therapy State University of Iowa Hospitals Iowa City		†
KANSAS		
Ruth G. Monteith Section of Physical Therapy Education University of Kansas Medical Center Kansas City 12	†	†
LOUISIANA		
Isadore Brown, Acting School of Physical Therapy Charity Hospital of Louisiana New Orleans 12		†
MASSACHUSETTS		
Adelaide L. McGarrett Physical Therapy Department Boston University Sargent College 6 Everett Street Cambridge 38	†	†
Constance K. Greene Department of Physical Therapy *Bouvé-Boston School, Tufts University Medford 55	†	
Shirley M. Cogland *Program in Physical Therapy Simmons College-Children's Hospital 300 Longwood Avenue Boston 15	†	†
MICHIGAN		
Virginia Wilson Curriculum in Physical Therapy University of Michigan University Hospital Ann Arbor	†	†
MINNESOTA		
Darrell D. Hunt School of Physical Therapy Mayo Clinic Rochester		†
Wilbur L. Moen Course in Physical Therapy University of Minnesota 860 Mayo Memorial Hospital Minneapolis 14	†	

* Accepts women students only.

‡ Baccalaureate degree available from an affiliating college or university.

	Degree	Certificate
MISSOURI		
Sr. M. Imelda, S.S.M. Department of Physical Therapy St. Louis University 1325 South Grand Boulevard St. Louis 4	†	
Beatrice F. Schulz Department of Physical Therapy Washington University School of Medicine 660 So. Kingshighway St. Louis 10	†	
NEW YORK		
Dorothy L. McLaughlin Albany Medical College Division of Physical Therapy Albany 8	‡	†
Mary E. Callahan Courses for Physical Therapists Columbia University College of Physicians & Surgeons 630 West 168th Street New York 32	†	†
Elizabeth C. Addoms Physical Therapy Curriculum School of Education, New York University Washington Square East New York 3	†	†
Mildred F. Heap Program in Physical Therapy University of Buffalo 2183 Main Street Buffalo 14	†	†
NORTH CAROLINA		
Helen Kaiser Division of Physical Therapy Box 3403, Duke Hospital Durham		†
OHIO		
Robert D. Kruse Course in Physical Therapy Frank E. Bunts Educational Institute 2020 East 93rd Street Cleveland 6		†
Gladys G. Woods School of Physical Therapy Ohio State University University Hospital Columbus	†	†
OKLAHOMA		
Thelma Pedersen School of Physical Therapy University of Oklahoma, Medical Center Oklahoma City 4	†	†
PENNSYLVANIA		
Dorothy E. Baethke Division of Physical Therapy University of Pennsylvania Morgan Bldg., 205 S. 34th Street Philadelphia 4	†	†
Kathryn Kelley Curriculum in Physical Therapy D. T. Watson School of Physiatrics Leetsdale	‡	†
PUERTO RICO		
(All classes given in Spanish) Lutgarda V. Piñeiro School of Physical & Occupational Therapy Candelaria & Mandry Streets Stop 22, Santurce	†	†
TEXAS		
Doris E. Porter Grady Vaughn School of Physical Therapy Baylor University Hospital Dallas 1	†	†
Cecelia J. Lee School of Physical Therapy Hermann Hospital Houston 25	‡	†
Ruby Decker School of Physical Therapy The University of Texas Medical Branch Galveston	†	†
VIRGINIA		
Susanne Hirt School of Physical Therapy Medical College of Virginia Richmond 19	†	
WISCONSIN		
Beth J. Phillips Curriculum in Physical Therapy Marquette University School of Medicine 561 North 15th Street Milwaukee 3	†	
Margaret Kohli Course in Physical Therapy University of Wisconsin Madison 6	†	†
U. S. ARMY MEDICAL SERVICE		
*Physical Therapy Course Army Medical Service School Brooke Army Medical Center Fort Sam Houston, Texas Write to: The Surgeon General Department of the Army Washington 25, D. C. Att.: Personnel Division		†

* Accepts women students only.

‡ Baccalaureate degree available from an affiliating college or university.

Please direct all inquiries regarding tuition, entrance requirements and other specific information to the school and *not* to the American Physical Therapy Association.

Abstracts

The Association Between Antibodies Against Poliomyelitis and Muscle Weakness in a Normal Population

David Sachs, Jean Bailey, Jacqueline Baumeister and Michael L. Furcolow (The Communicable Disease Center, Bureau of State Services, Public Health Service, U.S. Department of Health, Education and Welfare, and the Department of Pediatrics, University of Kansas Medical School), PEDIATRICS, 21: 771-780, May 1958

Many physicians believe that subclinical poliomyelitis infections may cause residual weakness. For example, it is thought that unrecognized poliomyelitis may be a major cause of so-called "idiopathic" scoliosis. Such an impression is well founded logically, for it is known that poliomyelitis occurs frequently as a subclinical infection and that poliomyelitis virus sometimes irreversibly damages lower motor neurons, subsequently causing atrophy of the muscle fibers controlled by the neurons and, accordingly, weakness of the muscles which are involved; therefore, it is reasonable to hypothesize that subclinical poliomyelitis infections may cause detectable residual muscle weakness in a fraction of those persons with unrecognized infections.

The authors set up a study to test this hypothesis. This was done by examining a group of "normal" people; that is, people who were selected for reasons other than presence or absence of history of clinical poliomyelitis. The blood of each participant was titrated for antibodies against polioviruses, and a physical therapist examined each participant for muscle weakness. This paper presents the results of these two sets of measurements and discusses them in relation to the hypothesis stated above.

Three population groups were included in this study: Prairie Village, Roeland Park, and Kansas City, Kansas. The muscle examinations were done according to the scheme used in studies of the use of gamma globulin in prophylaxis against poliomyelitis in 1953. This testing procedure was developed by the D.T. Watson School of Physiatrics. Sera were obtained from the groups in Prairie Village and Roeland Park in October 1953 and from the group in Kansas City in April 1954. Antibody titrations were carried out on each serum for each of the three types of poliovirus. A total of 450 persons was studied.

It was shown that the presence of antibodies against poliomyelitis was associated with the presence of mild muscular weakness in two middle class communities, but not in a third community of lower socioeconomic status. The association in the first two communities is interpreted as confirmation of the clinical impression that unapparent poliomyelitis infection can cause detectable residual muscle weakness. Muscle weaknesses were present in almost all of the children examined in the third community, but were not associated with the presence of antibodies against poliomyelitis. It is conjectured that this high prevalence of muscle weakness might be due to deficient nutrition.

In order to investigate the reliability of the muscle evaluation technic, 29 children were independently examined by each of two physical therapists with experience in using the technic. The results confirm the results of Lilienfeld et al. in showing that the technic is relatively reliable.

Chronology of Circulatory Changes in Poliomyelitis

A. W. Trott, Mary D. Nesline and W. T. Green (Children's Hospital and Harvard Medical School, Boston, Massachusetts), J. BONE SURG., 40-A: 245-255, April 1958

This article reports results of a study to determine the origin of circulatory changes and sequential developments occurring in limbs paralyzed by poliomyelitis. One hundred fifty-three patients were observed in this study, each having one normal leg and one involved with polio. Average age was 6.5 years and the average number of tests during the first three years of the disease was five. Skin and muscle temperatures were taken at constant room temperatures whenever possible to determine peripheral circulation measured at two depths. Muscles below the knee were rated numerically according to function and power.

Before beginning the studies with involved limbs, skin temperature tests were recorded from normal persons to determine any significant differences between the two lower extremities. Since testing of the involved limbs was begun as early as 8 days following onset of poliomyelitis, skin temperatures during the first 40 days of the disease showed an increase in warmth of the affected leg. After the first 4 months, however, there was a tendency toward coldness in the abnormal limb. Six months later, coldness appeared in muscles mildly paralyzed as well as those severely paralyzed. The three year studies showed that coldness recorded at six months had remained relatively constant.

Specific area changes revealed that decreased skin temperatures were greatest with moderate to severe paralysis after 13-18 months. The medial malleolus, warmer than usual during the first 20 days, became colder after 5-6 months in all groups. Midshin region was colder after 40 days in the moderate and severe cases, and after 7 months with mild paralysis. The medial belly of the gastrocnemius showed coldness very irregularly in patients with mild paralysis; after 5-6 months with moderate involvement and within 40-120 days in severe cases. The tibial tubercle and medial femoral condyle showed changes after 5-6 months in the poor and fair groups. With mild paralysis, coldness of skin over the tibial condyle was irregular, but was consistently apparent over the femoral condyle.

Muscle temperatures taken in the gastrocnemius proved more variable. Mild cases of paralysis showed no significant difference, with the moderate paralysis showing coldness 5-6 months later. Severe involvement recorded coldness that persisted years after the initial reading.

The authors also correlated the temperature differences with growth in leg length. With mild paralysis recording minimal changes in temperatures, they found also minimal inhibition of leg length. Accordingly, greater inhibition of leg growth appeared in the moderately to severely involved extremities.

From the studies, supplemented with graphs and charts, the authors see a direct relationship between the degree of coldness and the extent of paralysis. Also, because of the time lapse between onset of poliomyelitis and temperature changes, plus the evidence of minimal changes in temperature of the great toe, the opinion is that the disease has little effect on the sympathetic nervous system. Later experiments producing circulatory reaction to externally applied cold, support this opinion because the affected extremities responded equally with the normals.

The mechanism causing chronic vasoconstriction is unclear. A theory proposes that there is diminished blood flow into an extremity with decreased muscle mass with associated disuse, thus having reduced

vascular requirements and lowered efficiency of venous return. This chronic vasoconstriction is not the immediate effect of paralysis but requires time to develop, and the degree parallels the extent of paralysis.

Neurosurgical and Neurological Aspects of Industrial Trauma

Philip J. Huber, (Detroit, Michigan), INDUST. M. & S., 27: 177-178, April 1958

Patients who have problems of a neurosurgical or neurological nature comprise approximately 10 per cent of injuries occurring as a result of industrial trauma. These compensable patients seem to differ from the so-called "average" private case in their responses to therapy and end-results. Although the trauma to the central nervous system is similar, the compensable patients do not seem to recover from the disability as readily. The author attempts to explain this situation from a neurosurgical point of view and presents suggestions for its improvement.

Any surgeon-patient relationship has seven responsibilities. These include excellent surgery, enlistment of the patient's participation in recovery of function, study of the patient's economic and social problems, early use of physical medicine and expert consultation, extension of care over the entire period of disability, and recognition of the potential of modern rehabilitation procedures, with avoidance of litigation that prevents complete recovery of function.

Industrial patients differ from the so-called "average" patients since the industrial physician is anxious to return the patient to duty as soon as possible. Sometimes these patients who have been returned to duty are referred much later to clinics and cannot be fully rehabilitated because of unrecognized nerve injuries and fixed soft tissue injuries. The author emphasizes that the timing of consultation is extremely important. Current workmen's compensation laws tend to prevent the full use of modern rehabilitation. The injured person often ends up with a desired sum of money which he spends and a disability which he keeps.

Complete neurological studies must be performed and adequate treatment instituted. Appropriate neurosurgical procedures should be carried out if indicated. Immediate plans should be made for rehabilitation. Early ambulation and psychotherapy should be used for head injuries. The facilities of physical medicine should be employed to assist maximal recovery of spinal cord, nerve root, and peripheral nerve injuries.

The author states that if these suggestions are followed the difference in responses of industrial and private patients would not be as great.

Studies of Cardiac Output During the Early Phase of Rehabilitation

F. J. Kottke, W. C. Kubicek, J. N. Danz and M. E. Olson (Department of Physical Medicine and Rehabilitation, University of Minnesota Medical School, Minneapolis), POSTGRAD. M., 23: 533-544, May 1958

In view of the fact that 85 per cent of patients survive an acute episode of myocardial infarction the initial care of cardiac patients should include the beginning steps of a rehabilitation program. The program of restoration is long and involved. The decisions as to what the patient may or may not do during his convalescence must be made by the physician.

There has been a tendency to protect the cardiac patient by restricting him to such a low level of activity in work and recreation that there will be minimum stress on the myocardium. This type of restriction produces psychogenic invalidism in many patients.

The authors discuss the methods of estimating cardiac output. A series of studies were carried out to obtain information concerning the requirements for cardiac output of various types of activities commonly performed by cardiac patients in the hospital during convalescence. These studies were done on healthy young women accustomed to laboratory procedure. Oxygen consumption and arteriovenous oxygen difference were obtained. The calculated cardiac output represents the true cardiac output only to the extent that arteriovenous oxygen difference tends to change slowly. The pulse rate was recorded from a Waters cardiotachometer.

It is widely recognized that postural changes affect the heart and cause changes in pulse rate. The cardiac output decreases on the assumption of a sitting position (from recumbency).

The baseline used in these studies was cardiac output—relaxed, resting, fasting while lying supine in bed. If a person sits quietly with support of head, trunk, and extremities and with feet and legs dependent, the cardiac output is slightly lower. This appears to be the condition of minimum cardiac work.

Light activities using the hands increase the cardiac output very little. The pulse rate cannot be considered an index of cardiac work if the posture is changed. Pooling of blood in the feet and legs is an important factor in the lower cardiac output when sitting than when supine. A classification of the relative stresses produced by various activities is suggested. This should be based on the endurance limit of the normal cardiovascular system.

Electromyography of Two-joint Muscles

John V. Basmajian (Department of Anatomy, University of Toronto, Toronto, Ontario, Canada), ANAT. REC., 129: 371-380, November 1957

The purpose of this study was to test a thesis proposed by Markee and his associates who stated that two-joint muscles of the human thigh can act at one end without influencing the other end. The author felt this was contradictory to the understanding of muscular action.

The rectus femoris, semitendinosus, and semimembranosus were subjected to electromyographic study in 20 normal male volunteers. Three and sometimes five bipolar concentric needle electrodes were inserted in series in the muscle belly. The muscle potentials were recorded simultaneously by cathode ray oscillographs and 35 mm. film. Activity was recorded from the proximal, middle, and distal portions of these three muscles during voluntary motion.

The rectus femoris was thus observed during hip flexion and knee extension while the semitendinosus and semimembranosus performed hip extension and knee flexion. In none of the observations was there greater activity in the proximal part of the muscle when the proximal (hip joint) was acted upon. In general the greatest activity occurred in the middle portion regardless of which joint (hip or knee) was being acted upon.

The author's interpretation is that the evidence presented suggests that muscles pull directly from one end to the other simply because all parts of

the muscle belly contract together. the greatest activity being at the middle of the belly. It is pointed out that this is not true for muscle bellies in the parallel or parallel heads of large muscles such as the biceps brachii. It is felt that it is a rare occasion when the proximal or distal end of a two-joint muscle acts independently.

Responsibilities in Cerebral Palsy: Individuals, Society, and Voluntary Agencies

E. Ellis (The Percy Hedley School for Spastic Children, Newcastle upon Tyne), LANCET, LOND., 1: 784-786, April 12, 1958

Evaluation of five years' experience with cerebral palsied children in a special school of northern England formed the basis for definition of responsibilities which both individuals and society as a whole must assume to promote improved understanding, care, and education of the child with cerebral palsy.

Among the individuals most immediately affected by cerebral palsy are the parents, the first link in the chain of management of the child. With continuous interpretation of the full significance of the diagnosis, cerebral palsy, to the parents, it is hoped that an attitude of acceptance of disability may pervade the child's home environment. Home care is endorsed as psychologically and economically superior to institutional segregation.

If the doctor must act as diagnostician and the interpreter of the condition, so must the therapist demonstrate and explain to the parent ways of modifying the child's development at home; the parent is made a participant in therapy procedures rather than a bystander "in a waiting room while the child receives the expert attention of the therapist in the inner room." Since the number and kind of environmental stimuli may be limited by the child's diminished motor activity and possible abnormal sensory perception, the sensory experiences of the child, as well as motor development, comprise the therapy program. Toys and such materials as water, sand, dough and plasticine may help to widen the sensory experiences of the child.

Society is encouraged to establish welfare agencies such as social clubs and holiday homes for the affected children to combat social isolation of the family unit as well as the child. For the child with mild motor disability the normal or open air school is advised. Two types of special schools are prescribed in order to segregate the child with combined severe mental and physical defects from the one whose physical disability is not impeded by below normal intelligence.

Organizations of parents of these children are credited with achieving nationwide interest in cerebral palsied children. However, since much of the publicity has been imbued with over-optimism, it is suggested that parent associations should re-evaluate their purpose of helping the membership accept the inescapable facts of their children's limitations.

With recognition that many aspects of cerebral palsy require further exploration, there is a continued need for long term studies by clinical scientists, educationalists, and welfare workers. Such investigations may be financially supported by research grants from voluntary societies interested in this branch of social service.

Infections of Vertebral Interspaces After Operations of Intervertebral Disks

C. Sullivan, W. Bickel, H. Svien (Mayo Clinic, Rochester, Minn.), J. AM. M. ASS., 166: 1973-1977, April 19, 1958

The report is based on the detailed study of 11 patients encountered in recent years. Due to latent symptoms, lack of postoperative complaints, and absence of fever, the diagnosis of this condition may be difficult. The patient's complaints may be so bizarre that the physician may consider the entire process to be functional.

The onset of symptoms may be delayed as long as 10 weeks. Severe and excruciating pain in the lumbar region is the most characteristic symptom. Physical examination of the patient is often difficult due to the acute lumbar pain and spasm of the erector spinae muscles. None of the patients demonstrated evidence of progressive involvement of the nervous system.

The earliest roentgenographic finding is fuzziness of the white epiphyseal plates adjacent to the involved interspaces. The interspace gradually collapses and proliferation of new bone occurs. Progression of the inflammatory process within the interspace to bony fusion appears to be almost inevitable.

The only significant laboratory finding is the increased erythrocytic sedimentation rate. After roentgenographic evidence of fusion appears, the sedimentation rate returns to normal.

The treatment depends primarily on proper immobilization of the spinal column in a plaster-of-paris cast. Antibiotics are indicated in every case of infection of the interspace. Open drainage of the interspace is a matter of opinion. Three case histories are included in the report.

Discography

H. O. Peterson (University of Minnesota, Department of Radiology, Minneapolis), POSTGRAD. M., 23: 512-517, May 1958

The incidence of clinically significant disease of the intervertebral disks of the lumbar area is extremely high. The anatomy, pathology, pathogenesis, and optimal treatment are still obscure. This is due to the inherent difficulty of studying the area.

Lindblom introduced the technic of discography in 1948. This author has altered the original technics in the direction of simplification.

The procedure is done with the patient prone on a fluoroscopy table. Points are located where it will be possible to insert a 20 gage 3½ inch needle between the spines with the point of the needle directly over the disk when it reaches the subarachnoid space. A 25 gage needle is slipped through the lumen of the guide needle and a radiopaque solution is injected into the disk. Immediately following this films are made anterior-posterior, lateral, and oblique.

In a clear cut case of herniated disk the patient will experience severe pain as the offending disk is injected. At present the belief is that if injection does not cause pain, the disk is not significant, even though it may be abnormal anatomically.

A normal film shows two distinct disk-like layers of medium separated by a space containing medium of much less density. As a disk deteriorates the nucleus pulposes dehydrates and fragments and tears are seen in the annulus fibrosis. If the entire disk degenerates the contrast medium will diffuse throughout the whole disk.

Discography has its greatest diagnostic use in the case where myelography is negative or equivocal. The greatest disadvantage is that the procedure is painful and difficult to perform. Diskography is a relatively new procedure which gives promise of real diagnostic value in certain cases of degenerated intervertebral disks.

Head and Neck Pain in Temporomandibular Disease and Muscle Spasm

Arthur S. Freese (Adjunct Dentist, Beth Israel Hospital, New York), A.M.A. ARCH. OTOLAR., 67: 410-415, April 1958

Knowledge of the anatomy of the temporomandibular joint existed as early as 3000 B. C. The basic anatomy of this joint is well known today but certain facts deserve special notice. The temporomandibular joint is a ginglymodiarthrodial joint formed by the articulation of the condyle of the mandible with the articular disk, the articular fossa, and the articular tubercle. There are great variations in the size, shape, degree of wear, and position of the condylar heads. There is even great variation between the two condyles in the same person. The disk is fused medially, anteriorly, and laterally to the articular capsule. Posteriorly, it is connected to the capsule by loose, highly vascular connective tissue and is supplied with nerves from branches of the auriculotemporal nerve.

The actions of the temporomandibular joint are complicated but it should be remembered that mastication represents only a small part of the daily work the joint performs. The author points out that in swallowing (which is estimated to occur every 60 to 90 seconds) the mandible rises, moves posteriorly, and then drops to its postural position. Other physiological actions which involve the joint are speaking, coughing, moistening the lips, and yawning. Clenching the jaws and grinding the teeth are considered pathological actions.

A thorough review of joint motion and mandibular musculature is presented. The author states that degenerative joint disease is related to the physiologic process of aging, and that repeated trauma, stresses, and strains that occur with time are the chief causes. The primary symptom which arises purely from the joint disease is pain in the joint on motion. Muscle spasms may be a cause or a result of the joint disease.

The most important forms of therapy are moist heat, analgesics, and limitation of the use of the part. Ethyl chloride sprayed over the area of the masseter is used effectively and is followed by several applications of moist heat at home. The prognosis is favorable once the muscle spasm is alleviated.

Management of Cerebrovascular Accidents in Elderly Patients

B. Marvin Hand (Hahnemann Medical College and Hospital, Philadelphia), GERIATRICS, 13: 293-299, May 1958

Cerebral vascular lesions are the most common cause of general or focal brain disturbances and are found in about 25 per cent of routine autopsies in a general hospital. The highest incidence of cerebral hemorrhage is in the fifth to eighth decades; whereas, cerebral thrombosis occurs most often in the sixth to eighth decades. The patient recovering from a cerebral vascular accident constitutes a major problem in chronic care and rehabilitation.

Cerebral vascular insufficiency or hypotension in the cerebrovascular tree may be caused by hemorrhagic shock, antihypertensive drugs, anesthetic, the carotid sinus syndrome, sympathectomy, traumatic shock, cardiac surgery, cardial infarction, and slow progressive occlusion of the carotid and basilar arteries. From the standpoint of treatment, it is more important to determine whether the lesion is a thrombosis, a hemorrhage, or an embolus than to know its exact location.

Cerebral thrombosis is more common than cerebral hemorrhage, occurring in the approximate ratio of 3 to 1. In general, a thrombus tends to form while the patient is at rest or during sleep. As a rule, loss of consciousness does not occur at the onset. When a large vessel, such as the middle cerebral artery, becomes thrombosed, the clinical picture is that of hemiplegia with or without clouding of the sensorium. If the artery on the left side is involved, the patient has difficulty with speech.

The most common cause of cerebral hemorrhage is arteriosclerosis. Usually the hemorrhage is preceded by stress of some sort, such as heavy lifting. In the usual case, the onset of the stroke is sudden. The patient may complain of intense headache followed in a matter of minutes by collapse and loss of consciousness. The usual signs of a flaccid hemiplegia appear early.

In middle-aged or elderly people, embolism is frequently associated with coronary thrombosis or auricular fibrillation. The symptoms are even more rapid in onset than those following intracerebral hemorrhage. In addition to flaccid hemiplegia, there is usually clinical evidence of shock.

As soon as the patient has recovered from the shock of the cerebral vascular accident, massage and passive movement of the paralyzed limbs should be instituted. It is essential that the patient be encouraged to perform for himself such activities as washing, dressing, and feeding as early as possible. At the end of the first week or 10 days, many patients are able to be helped into a sitting position. If there is no cardiac complication, the patient may be allowed to stand momentarily by the tenth to fourteenth day. This is beneficial from a psychological standpoint and hastens the return of postural sensibility.

Spasticity occurs in almost all hemiplegias and is the chief cause of flexion contractures in the upper extremity and extension fixation in the lower limb.

The patient should be encouraged to walk as soon as his general physical condition permits. Heat, massage, passive and active exercises, and muscle training should be used daily for at least several months to insure a maximum return of function. Many of these patients need a short leg brace with drop foot attachments.

Ruptures of Quadriceps Tendon

Carlo Scuderi (Chicago, Ill.), AM. J. SURG., 95: 626-634, April 1958

Ruptures of the quadriceps tendon are quite infrequent when compared to all types of injuries that occur about the knee joint. The author feels that this is due to the fact that the mechanism necessary to rupture the quadriceps tendon will more frequently fracture the patella, detach the patellar tendon, or produce a supracondylar fracture of the femur.

Eighteen patients supplied the data for this paper. All were treated in private or charity practice. A discussion of the etiology and pathology is presented. Without doubt the one common predisposing factor of rup-

tured quadriceps tendon is sudden violent flexion of the knee.

Early and careful surgical repair is indicated when the tear is complete. The patient is permitted partial weight-bearing in a cylinder cast with the aid of crutches 14 days after surgery. Illustrations demonstrating the knee function obtained in two patients accompany the article.

Maximum return of function may take 6-9 months from the date of surgery. Physical therapy procedures in the form of heat, massage, active and passive motions are recommended following removal of the cast.

A Comparison of the Mouth-to-Mouth and Mouth-to-Airway Methods of Artificial Respiration with the Chest-Pressure Arm-Lift Methods

Peter Safar, Lourdes A. Escarraga and James O. Elam (Department of Anesthesiology, Baltimore City Hospitals, Baltimore, Maryland), N. ENGLAND J. M., 258: 671-677, April 3, 1958

The authors present data obtained during 27 experiments on 25 (10 volunteers and 15 patients) anesthetized and curarized apneic adults. The studies were conducted to determine the effectiveness of the currently taught chest-pressure arm-lift methods of respiration as compared to mouth-to-mouth and mouth-to-airway methods of artificial respiration.

The efficacy of any method of artificial respiration depends on a patent airway. Without extension of the head (sniffing position), and without forward displacement of the mandible, the airway above the vocal cords of most unconscious patients becomes obstructed. The authors questioned whether the experiments conducted on the currently taught chest-pressure arm-lift methods of resuscitation were valid since they apparently did not consider the behavior of the natural airway in the unconscious patient. The experiments conducted on this method of artificial respiration appear to have been done with the patient's trachea intubated.

The authors report comparative data on tidal exchange using the chest-pressure method and the back pressure arm-lift method with and without an endotracheal tube. Although they were able to move adequate amounts of air with these methods in curarized healthy adults through an endotracheal tube, this was not possible without the tube in 13 of 16 subjects. Even with the use of the artificial airway the "push-pull" methods often failed because of pharyngeal obstruction due to flexion of the head or torsion of the neck.

Tidal volumes of greater than 1500 ml. were produced in all subjects by untrained operators with the mouth-to-mouth and mouth-to-airway methods.

The technic of the mouth-to-mouth and mouth-to-airway artificial respiration is described in detail. During the performance of these expired-air inflation methods both hands of the operator are available to provide proper support of the patient's head and mandible thereby maintaining the proper airway and increasing the pulmonary ventilation.

A new device called the mouth-to-mouth airway is recommended by the authors for use by ambulance personnel, policemen, beach guards, and others who are often called upon to give artificial respiration. The device provides an artificial oropharyngeal airway and a mouthpiece for the operator. It can be easily carried in the pocket, and provides a more acceptable method of expired air inflation than the simple mouth-to-mouth technic.

The authors conclude that the teaching of the back-pressure arm-lift method of artificial respiration should be discontinued, and the mouth-to-mouth and mouth-to-airway methods be instituted.

Whiplash Injury of the Neck: Symptoms, Diagnosis, Treatment and Prognosis

Murray M. Braaf (565 West End Ave., New York, New York) and Samuel Rosner, N. YORK STATE J. M., 58: 1501-1507, May 1, 1958

Whiplash injury of the neck may be the result of any injury to the neck where the head is forcibly thrown backward or forward with a recoil in the opposite direction.

The authors conducted a survey of 1,000 cases of whiplash injury in an attempt to improve the understanding and management of this condition. Most of the patients were between the ages of 30 and 50, and most of them had been injured in car accidents. They were observed from 1 to 10 years. Cases of accompanying head injury or concussion were excluded from the study.

Symptoms were divided into three phases: the acute, the chronic, and the delayed. Immediately after injury, neck pain is usually severe. There may be many other symptoms referred to other parts of the body such as headache, pain in the upper extremities, or paresthesia of the upper extremities. Disturbances of the eyes, ears, nose, throat, and gastrointestinal tract, may also be evident. In the chronic phase, neck pain may disappear, but the radicular symptoms and referred symptoms may persist. In the delayed phase, symptoms may not appear until months or years after the accident.

In the series studied, the authors found that 80 per cent of the cases received complete relief of symptoms, and 10 per cent satisfactory relief by the use of cervical traction in the supine position. In this position the Sayre's halter traction was used with 5 to 15 pounds of weight. Traction was applied for 30 minutes followed by 2 hours of rest. This was continued intermittently through the day, and traction was removed for sleeping. The patient was hospitalized for 7 to 21 days, and when symptoms subsided the patient was discharged, but continued a reduced program of traction therapy for 2 to 3 months longer. When acute symptoms subsided, the patient was given graded strengthening exercises. Warm moist heat was used for muscle spasm or pain. Drugs were also used to relieve the symptoms.

The authors feel that with proper early treatment of whiplash injury, as outlined above, the chronic and delayed phases may be averted.

The Significance of Nuchal Rigidity

M. Wood, H. Dodge, Jr., E. Johnson, Jr. and D. Mulder (Mayo Clinic and Mayo Foundation, Rochester, Minnesota), POSTGRAD. M., 23: 403-409, April 1958

One of the most difficult problems in medicine is the correlation of the signs with the symptoms and to incorporate them into a feasible diagnosis. The presence of nuchal rigidity is a sign which is not specific to any one disease but is limited enough in occurrence to be of great value to the physician.

Nuchal rigidity is the inability to produce cervical flexion, either actively or passively, without encountering resistance and causing pain and spasm. The rigidity affects the ex-

tensor musculature of the neck so that while flexion is impossible, hyperextension may be readily carried out. When the condition is marked the patient may progress to the opisthotonoid posture.

Nuchal rigidity is the most widely accepted and encountered sign of meningeal irritation. The seriousness of the rigidity is dependent upon its cause. Four main groups of etiologic factors are outlined—irritation of the basilar meninges, involvement of the cervical vertebrae, involvement of the soft tissues of the neck, and involvement of the central control of the musculature.

Brief theories presented by other authors are discussed. Clinical examination to reveal nuchal rigidity should be carefully done and the cause sought. It is often difficult to uncover the underlying pathology. The examiner can grade the degree of rigidity into four categories. In grade 1 rigidity, the symptoms develop just at full anterior and lateral flexion. In grade 4 rigidity, the examiner is totally unable to flex the neck as the patient resists any attempt to lessen his 180° + of neck extension. Grades 2 or 3 are increments between these two.

The grading is of no value in determining either the cause or the prognosis. It offers however, a clinical yardstick for following the patient's condition after the etiology has been determined. Rigidity can vary widely, even in a 24 hour period, and may disappear and reappear in the course of meningitis. Many unusual forms of nuchal rigidity may be seen in clinical medicine.

Bowel Regulation for Patients With Spinal Cord Injury

A. Estin Comarr (Veterans Administration Hospital, Long Beach, California), J. AM. M. ASS., 167: 18-21, May 3, 1958

The function of defecation in patients with lesions of the spinal cord requires constant attention and is of paramount importance, especially during the first few months after injury. The vast majority of spinal cord injury patients lose voluntary control of the rectal sphincter and are usually constipated; however, during the stage of spinal shock and areflexia, they may have involuntary evacuations. This is explained by the fact that the vagus nerve is stimulated. These involuntary bowel movements in bed should not be stopped for esthetic reasons; instead, the patient should have the necessary protection pads around the anus.

Bowel care begins during the first few days after injury, whether the patient is in a regular type of hospital bed or on a Foster frame. A regular routine is practiced from onset. In order to have bulk, the patient must eat three regular balanced meals. Water intake is scheduled hourly from 6 a.m. to bedtime as part of urinary bladder training.

Suppositories, abdominal massage following the course of the larger intestine in a clockwise direction, digital stimulation, and digital removal of scybala are usually necessary. Mild laxatives and enemas are used sparingly.

Every effort is made to get the patients out of bed and into wheel chairs, braces, and/or tilt tables as early as possible, not only to prevent osteoporosis and urinary calculosis, but to develop "habit time" over the toilet. Once the patient is visiting the toilet regularly, the same procedure as is practiced during bedfast period is continued; namely, introduction of suppositories, massaging and tapping of the abdomen, and straining.

Regulation of defecation may not occur quickly; but the doctor and nurse who conscientiously work on a daily basis on this problem will be rewarded with more patients regulated by "reflex stimulation" rather than by "digital evacuation."

Cerebrovascular Disease in General Practice

A. Iannone and A. B. Baker (University of Minnesota Medical School, Minneapolis), POSTGRAD. M., 23: 460-465, May 1958

There are three clinical types of cerebrovascular disorders, namely, vascular insufficiency, intracerebral hemorrhage, and subarachnoid bleeding.

The symptoms of insufficiency usually appear rather suddenly, may be permanent or temporary, and usually are focal in nature. They do not progress.

Intracerebral hemorrhage is sudden in onset and the patient shows signs of increased intracranial pressure. Prognosis is uniformly poor.

Subarachnoid bleeding usually occurs in the younger age group. It may also be acute in onset resulting in intense occipital headache, nuchal pain and rigidity.

The etiologic factors involved in vascular diseases of the nervous system vary with age. A rapid survey of etiologic factors is helpful. In infancy and childhood vascular disease is unusual and in most cases is a complication of some other pathology. Rupture of congenital aneurysms with subarachnoid bleeding is not seen in infancy but first appears in childhood. Embolic phenomena predominate in adolescence and youth. In late adolescence ruptured aneurysm is frequent. Intracerebral bleeding is uncommon at this age. Vascular thromboses comprise the most common pathologic condition in the middle age group. Intracerebral thromboses are seen principally in persons with long standing and fairly severe diabetes or hypertension. Any of the processes occurring in middle age may also occur in old age. The most common cause, however, is arteriosclerosis.

Specific vascular syndromes are described. These are syndromes in which the symptomatology is characteristic. The common ones described are: (1) thrombosis and insufficiency of the internal carotid artery, (2) insufficiency of the basilar artery and (3) intracerebral hemorrhage and thrombosis.

The Effect of Exercise on the Body

Edward J. Van Liere (West Virginia University, School of Medicine, Morgantown), WEST VIRGINIA M. J., 54: 153-156, May 1958

It is accepted by many people, including physicians, that exercise is beneficial to the health of the individual, increasing his work capacity, and prolonging his life, although there is no scientific proof. During the past decade, however, there has been a divergence of opinion as to the value of exercise.

In this paper the author reviews the effect of physical exercise on the body.

1. The effect of exercise on the heart and the circulation is one of aiding circulation through increasing muscle tone. The tone of the diaphragm is also increased which aids in returning blood to the heart. The metabolites produced by exercise cause peripheral vasodilitation so that more blood can pass through the vessels.

2. The effect of exercise on respiration causes deeper and more rapid breathing. Many physicians believe deep breathing for normal healthy

lungs is desirable, but the beneficial effect on the normal lung has not been clearly demonstrated.

3. Moderate exercise has little effect on the stomach secretion or motility. Severe exercise may depress these functions. The effect of exercise on the intestines is not known.

4. The effect of exercise on the psyche may be of greatest importance, as many people believe that physical exercise makes them feel better. Exercise has a tendency to whet the appetite and is not too successful in bringing about a marked weight reduction.

Physical training is the repetition exercise performed by a person in preparation for a specific activity, resulting in muscular hypertrophy, changes in cardiovascular and respiratory systems, and changes in blood and tissue chemistry. It is felt that, despite the lack of scientific proof, a moderate amount of physical exercise should probably be considered beneficial to the human body.

Our Abstracters for August

We are indebted to the following Association members for their assistance in the preparation of the abstracts appearing in this issue.

Rachel Adams — Jean Cuthbertson
Joan Brewer — Elizabeth Davies
Dorothy Briggs — Miriam Partridge
Jean Thibaut

Book Reviews . . . . .

The Handicapped and Their Rehabilitation. *Edited by Harry Pattison, M.D., F.A.C.P., Director of The Potts Memorial Institute, Inc., Hudson, New York. Cloth; price $4.75. Pp. 944; illus. Charles C Thomas, Springfield, Ill., 1957.*

The editor tackled a gargantuan task in attempting to "inform those interested in rehabilitation, especially members of the rehabilitation teams, about the numerous disabilities involved and the requisite training, duties, and responsibilities of the several disciplines." He did this by assigning chapters to well-chosen authorities in the disciplines and disabilities selected to be represented. He believed that mutual knowledge and understanding would foster better integration and cooperation in patient rehabilitation.

This 900-page book is divided into four major sections: Foundations, The Disabilities, The Rehabilitation Team, and Special Problems and Procedures.

The relatively short first section includes two chapters. The first elaborates the philosophy, operation, and effectiveness of a physical medicine and rehabilitation service headed by a physiatrist. The second, written by the editor, emphasizes the human constitution as the basis of rehabilitation, and tresses the need for individuality in the "holistic" approach to effective patient management.

Section two, dealing with disabilities, includes chapters on the Injured Worker, Nontraumatic Disabilities, Plastic and Reconstructive Surgery, the Handicapped Child, the Patient with Heart Disease, Tuberculosis, the Aged, the Blind, Patients with Hearing and Speech Defects, the Diabetic, the Cancer Patient, the Epileptic and Psychiatric Problems.

With such a wide selection of disabilities to be represented and with an equal number of co-author specialists, as one might expect, there is frequent divergence from the alleged purpose of the book, and the section lacks continuity. When taken individually, most of these articles are exceptionally well written; and within the confines of a chapter, specific disabilities are usually described or classified, treatment is outlined, and/or special problems, needs and procedures are described. Many of the disabilities are clearly elaborated in regard to the need for and methods of effective rehabilitation. The chapter by Dr. Richard Clark on the patient with heart disease is particularly outstanding in this respect. Those sections dealing with the aged, nontraumatic disabilities, the injured worker, the diabetic and the cancer patient, present pertinent information effectively and also succeed in correlating specific disabilities with rehabilitation concepts. This latter point is neglected by some authors.

In the section dealing with the rehabilitation team, each specialty is represented in a chapter in which the respective duties, responsibilities, training, and in some instances, fondest aspirations, are described. Selected for representation are: The Executive Assistant (or Rehabilitation Coordinator), the Medical Social Worker, Professional Nurse, Occupational Therapist, Vocational Counselor, Physical Therapist, Corrective Therapist, Educational Therapist, Manual Arts Therapist, the Library Service (bibliotherapy), Music Therapy, the Psychologist, and the Clergy. The Speech Therapist, Audiologist and Psychotherapist are included in the section dealing with disabilities.

In this section a confusing overlap of function is described, and again lack of editorial interpolation allows emphasis to fall where it may. Occasionally it is obvious that the duties and responsibilities outlined for the workers in these fields require training beyond that prescribed in the basic educational requirements for that specialty. Many of these articles appear to be written with a sense of dedication, but the specific services are described as the "sine qua non" of the rehabilitation team.

The author of the chapter devoted to physical therapy does not adequately emphasize the role of physical therapy in patient rehabilitation. Many of the other authors do go beyond the objectives stated in the Preface and elaborate the scope of their specialty. It is unfortunate that lack of editorial guidance and enforcement of format uniformity render this article, by contrast, a disappointing reflection of the valuable and individual contribution of physical therapy to total patient rehabilitation.

Other than the confusing overlap of responsibilities described, the articles in Section Three contribute toward the fulfillment of the purpose of the book. Despite the omission of editorial control in view of a certain amount of inspired drum-beating, the prime importance of the patient and his individual needs emanate from each chapter in a gratifying manner.

The first part of Section Four deals with miscellaneous problems, including some interesting aspects of Nutrition, Fatigue, Ergotherapy, Sheltered Workshops and an apparently very effective Home Economics Program.

The second part of Section Four presents the problems of employment of the handicapped worker in an enlightening manner. In separate chapters the views of labor, management, the insurance, workmen's compensation, and placement specialists are elaborated in regard to their problems, accomplishments, recommendations and goals. The importance of the cooperative effort of all agencies and organizations concerned

in successful restoration of the handicapped worker to gainful employment is emphasized. It is pointed out that this responsibility "rests on many shoulders including medicine, management, labor, the insurance companies and the government represented by the State Compensation Laws, its administrators and various Federal bureaus." It is also pointed out that despite the seemingly overwhelming costs of effective rehabilitation services, the result is a universal gain to the employee, the employer, the insuring agencies, and the nation.

A chapter is devoted to the function and operation of the State-Federal Vocational Rehabilitation program. This chapter includes a brief historical review of rehabilitation legislation and also a valuable series of charts outlining the provisions of Workmen's Compensation Laws in various states and territories.

Most of the articles are well documented with useful reference lists.

Home Exercises in Language for Aphasic Patients. *By Thomas D. Houchin, Assistant Professor of Speech Pathology, Emerson College, Boston; Speech Pathologist, Rehabilitation Unit, Holy Ghost Hospital, Cambridge, Massachusetts. Paper; price 30 cents. Pp. 8. Holy Ghost Hospital, Cambridge, Massachusetts, 1957.*

The key to this 8-page pamphlet may well be found in the postscript where Mr. Houchin says, "There is no reason why language retraining cannot be fun!" This optimistic attitude is of special importance and value in the effort to help adult patients, who once used language normally, to redevelop speech, reading, writing, and meaningful gesture.

The pamphlet offers speaking, reading, writing, and gesture materials for use at home, to augment specific speech and language instruction. The suggestions are simple and encouraging and should be easy to follow.

There is such a scarcity of really usable materials for helping adult aphasics in speech and language retraining, that it is hoped Mr. Houchin will produce a larger instruction unit, making available a greater volume of materials with details for handling them, thus taking the patient and his home helper into the more advanced and complex stages of speech and language retraining, after the first simple (but highly important) goals have been reached. These are the months when the going gets tougher for the patient, when he needs more instead of less to work with, and guidance in how to go about it constructively.

Human Histology. *By Leslie Brainerd Arey, Ph.D., Sc.D., LL.D., Robert Laughlin Rea Professor of Anatomy, Emeritus, Northwestern University, Chicago. Cloth; price $6.50. Pp. 337. W. B. Saunders Company, Philadelphia, 1957.*

This book is one that has developed under the most favorable circumstances and, in a sense, has been in preparation for a period of more than 25 years. The author, Leslie B. Arey, is the Robert Laughlin Rea Professor of Anatomy, Emeritus, at Northwestern University. The book represents material, revised and expanded, that he used as he taught histology during his long and distinguished career as an anatomist. In scope the book is complete although in volume it is about one half the size of a standard textbook of histology. The difference is due to the omission of illustrations and bibliographies and the arrangement of the text material in outline form. Grouping and progressive indenting of subordinate matters in outline form make it an extremely useful source of information, not only in finding the pertinent points quickly, but in seeing how they fit into the general picture. Bone, for example, is discussed under 8 headings: General Features, Structural Elements, Bone Architecture, Vessels and Nerves, Metabolic Pathways, Regenerative Ability, Appearance in Section, and Functional Correlations. Structural Elements (of bone) are described under the subtopics: Bone Cells, Bone Matrix, Lamellae and Lacunae. Much of the descriptive material is written in single line sentences.

The author feels that the special advantages of the book extend into 3 fields: in laboratory study as a guide from generalities to particulars, in the consolidation of knowledge acquired from several sources into an orderly whole, and as a review source.

Human Histology is a valuable reference source for those with a limited knowledge of histology and for those who have done considerable work in this field.

Cardiovascular Rehabilitation. *Edited by Paul Dudley White, M.D., Physician, Massachusetts General Hospital, Boston. Howard A. Rusk, M.D., Professor and Chairman, Department of Physical Medicine and Rehabilitation, New York University College of Medicine; Director, Institute of Physical Medicine and Rehabilitation, N.Y.U.-Bellevue Medical Center, New York. Bryan Williams, M.D., Clinical Instructor in Medicine, Southwestern Medical School, University of Texas, Dallas; formerly on Staff (Cardiology) Massachusetts General Hospital. Philip R. Lee, M.D., Department of Internal Medicine, Palo Alto Clinic, Calif.; Assistant Professor of Clinical Physical Medicine and Rehabilitation, New York University College of Medicine. Cloth; price $6.50. Pp. 155. McGraw-Hill Book Company, New York, 1957.*

Cardiovascular Rehabilitation is an edited report of the major portion of a conference held at the Institute of Physical Medicine and Rehabilitation, New York City. The 35 participants in this conference were physicians, nationally recognized for their contributions in teaching, research, and the clinical practice of cardiology and rehabilitation. The editors are deans in their respective medical fields. The objectives of this conference were to discuss the major problems facing the practicing physician in the management and rehabilitation of his patients with cardiovascular disease; current and future research related to cardiovascular rehabilitation; the education of physicians and co-professional personnel, and the public, in an effort to derive maximum benefit from our present resources and skills in cardiovascular rehabilitation. In the discussion style in which this book is written, the participants have answered some queries and given birth to others.

The portion devoted to the major problems of the practicing physician in the management of cardiovascular disease, focuses the need for the cognizance of rehabilitation beginning with the diagnosis and recognition of the disease. This fits well in the category of preventive medicine.

Discussing current and future research in, or related to, cardiovascular rehabilitation, the need for the future is stressed. Emotional and physical energy expenditure for individual jobs with individual people need further delineating by physiologists. Vocational rehabilita-

tion of the cardiac patient will be enhanced when the industrialist can be further aided by the physiologist in matching employee with job demands.

The variations in education of physicians, co-professional personnel and the public, highlight the lack of uniformity in medical education and information on all levels. The very purpose of this conference, with the pooling of ideas and thinking, is heartening in medical and public education.

The unique style in which this book is written, precludes its use as a textbook or a reference book; however, it is impressive in giving the reader the feeling he is thinking with the experts. The function of the physical therapist in cardiovascular rehabilitation is not emphasized; however, the objectives, as discussed, should be of value to a physical therapist.

There are 400 references on many aspects of cardiovascular disease and rehabilitation. This is an excellent source of material for physicians in practice, in research, or in education in the field of cardiovascular disease or cardiovascular rehabilitation.

Scouting with Handicapped Boys. *Paper; price 75 cents. Pp. 64; illus. Boy Scouts of America, New Brunswick, New Jersey, 1957.*

Scouting With Handicapped Boys is a pamphlet published by the Boy Scouts of America mainly for those interested in organizing a scout program and to acquaint individuals, organizations, and hospitals with the possibilities of such a program for the handicapped.

It lists the channels through which a handicapped boy may receive scouting, tells how boys with all types of handicaps have been included in various kinds of scouting programs, and describes the activities of many troops throughout the country.

The pamphlet is highly testimonial, contains many photographs of troops and individuals partaking in scouting activities, and includes a thorough bibliography of selected references dealing with the various aspects of working with and understanding the handicapped.

Why Did This Have to Happen: An Open Letter to Parents. *by Earl Schenck Miers. Paper; price 25 cents. Pp. 28. National Society for Crippled Children and Adults, Inc., Chicago, 1957.*

Earl Miers, a former publisher and editor and now a successful author, is, in this pamphlet, sharing with parents his experience, feeling, and philosophy as a person with a physical handicap. He points out that the question of "Why did this have to happen" is usually unanswerable, and that concern with this may leave unsolved the many problems for which there are satisfactory solutions.

He relates with candor his personal annoyances, frustrations, and hardships along with the help and encouragement he received. He points out the need to maintain an open, tutored mind, intellectual strength, and spiritual stamina to compensate for bodily disabilities.

His acceptance of his disability and the philosophy for living he has developed will be helpful not only for parents of handicapped children but also for disabled adults.

The reviews here published have been prepared by competent authorities and do not represent the opinions of the American Physical Therapy Association.

on guard

Yes, she's never off duty in guarding family health. She balances the family diet, takes the children for their "shots," prods her husband to get his annual checkup. But what about *her* health?

Caring for herself is the greatest gift a woman can give her loved ones.

So don't delay – see your doctor about *your* checkup. It's *"living insurance"* against cancer.

AMERICAN CANCER SOCIETY

Our Book Reviewers for August

Hilda B. Case, M.D., Director of Physical Medicine and Rehabilitation, University Hospitals of Cleveland; Assistant Professor and Head of Division of Physical Medicine and Rehabilitation, Western Reserve University School of Medicine, Cleveland, Ohio.

Meryl Miles, Associate Professor, Department of Anatomy, University of Wisconsin, Madison.

Mary Pat Murray, Curriculum in Physical Therapy, Marquette University School of Medicine, Milwaukee, Wisconsin.

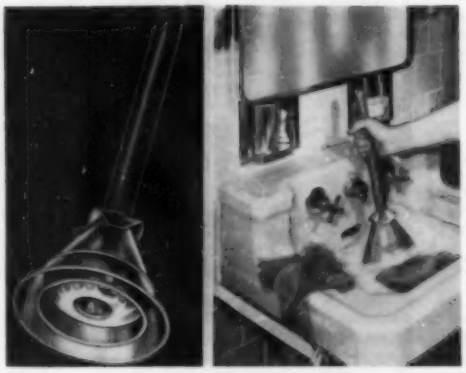
Louise Arey Esterer, Special Education Consultant, Longview, Washington; formerly, Supervisor of Special Education, Michigan State Department of Public Instruction.

Lee Pezzuti, Occupational Therapist, D. T. Watson Home, Leetsdale, Pennsylvania.

Jessie F. Waddell, Chief, Orthopedic Nursing and Physical Therapy, Michigan Crippled Children Commission, Lansing.

What's New . . . . . .

80. Baby Rapid Washer



Gentle but thorough washing is accomplished with the Baby Rapid Washer, which works by a series of plunger strokes. The downward stroke forces the air and water through the clothes and because the cone is sealed a vacuum is created; lifting the washer sets up tremendous pulling power, thoroughly cleaning the clothes. C. T. Childers Co.

81. Mastectomy Pamphlet

"Of course you can!" is a folded pamphlet containing information of interest to patients who have undergone a mastectomy. The pamphlet was prepared under the guidance of the Los Angeles County Medical Association and statistics were provided by the American Cancer Society. Ten exercises are illustrated and described as well as several hints on household activities which contribute to the rehabilitation of the patient. The manufacturer, publisher of the pamphlet, produces "Twin" Surgical Bust Forms in 28 sizes, 4 basic shapes. All forms are guaranteed to the wearer for six months. Lov-é Brassiere Company.

For more information on items write to The Physical Therapy Review, 1790 Broadway, New York 19, N. Y.

New items which may be of interest to physical therapists will be mentioned in these pages each month. The accompanying explanations are made by the manufacturers and have not been investigated by the *Physical Therapy Review.*

82. Safety Bathroom Frame

The new 1958 model Safety Bathroom Frame incorporates all the desirable features suggested by hospital tests of the old model in the field. It is a sturdy, rigid, portable, free-standing security frame which provides stable, reassuring handgrips and armrests at the toilet for safety and independence.

Three levels service child, junior, or adult without adjustment. Side loops and back bar adjust to fit all sizes and types of bowls. Corrugated rubber, bonded to the U-base in direct contact with the floor, prevents sliding. It can be used as a portable, free-standing frame, or it can be rigidly anchored to the toilet seat fittings with attachment clamps furnished with each unit. Self Ease Units, Inc.

Positions Available

PHYSICAL THERAPISTS: Staff positions. Opportunity for varied experience; 650-bed general hospital, near center of cultural and educational activities. Vacation, sick leave and social security benefits. Apply Personnel Director, Harper Hospital, Detroit 1, Michigan.

WANTED: EXPERIENCED physical therapist for Visiting Nurse Service. Immediate placement. Good personnel policies. Apply Miss Ruth E. Telinde, Director, 418 W. Mifflin St., Madison, Wisconsin.

PHYSICAL THERAPIST: Staff position in new, well equipped department in 200-bed general hospital; 40-hour week, one month vacation. Apply: Miss C. J. Gerrity, Chief, P. T., Princeton Hospital, Princeton, N. J.

QUALIFIED PHYSICAL THERAPIST for outpatient cerebral palsy treatment center. Liberal salary. Two months' vacation, sick leave. Liberal personnel policy. Contact Robert Schlitt, Director, Peninsula Cerebral Palsy Training Center, 901-24th Street, Newport News, Virginia.

PHYSICAL THERAPIST: part time or full time required for Crippled Children's program. Rate $4,000 per annum. For further information write Director, Fairfax County Health Department, Fairfax, Va.

IMMEDIATE PLACEMENT for qualified staff physical therapist in 306-bed general hospital; well equipped department serving both in- and outpatients; 40-hour week, paid vacations, paid sick leave. Write Assistant Director, Lima Memorial Hospital, Lima, Ohio.

STAFF PHYSICAL THERAPIST (FEMALE): For full time work in office of five orthopaedic surgeons. New refrigerated building, well equipped department. Write E. G. Derrick, Business Manager, The Orthopaedic Clinic, 2620 No. 3rd St., Phoenix, Arizona.

CHIEF PHYSICAL THERAPIST needed for well equipped department in association with nationally known crippled children hospital. Splendid, sound personnel policy and cordial atmosphere. Apply Personnel Director, Elyria Memorial Hospital, Elyria, Ohio.

STAFF PHYSICAL THERAPIST: for children's convalescent home; 40-hour week. Average stay—55 days. Excellent orthopedic staff. Excellent salary. Full maintenance availability at $50.00 per month. State time of availability in replying to: Junior League Home for Crippled Children, Nashville, Tennessee.

Registered Staff Therapist needed for a new P.T. Department in a 300-bed general hospital; sick leave, two weeks' paid vacation, 40-hour week; starting salary $350 to $400/mo.; Social Security, group participating Blue Cross-Blue Shield, Baptist Hospital, Beaumont, Texas.

CHIEF PHYSICAL THERAPIST: Starting salary at the rate of $6,420 per annum. Annual increments. Female only. Minimum of four years general experience in established physical medicine department. Interest in neuromuscular and joint problems. Also concept of total rehabilitation. Ability to work with full-time board certified physiatrist and supervise one staff therapist essential; 200-bed general hospital. Growing outpatient service in eastern Kentucky. Also available staff therapist positions in smaller community hospitals. Salary at the rate of $5,340 or $4,440 per annum depending on experience. Each hospital part of integrated three-state network. Progressive minded medical staff, modern equipment, excellent personnel policy. For application forms and further information write:

MINERS MEMORIAL HOSPITAL ASSOCIATION
Box #61, 110 Logan Street
Williamson, W. Va.

IMMEDIATE OPENING for physical therapist to supervise modern, well equipped established department in 350-bed general hospital. Excellent starting salary with semiannual increments. Please apply to Administrator, Mercy Hospital, Davenport, Iowa.

WANTED: Registered Physical Therapist. Unusual opportunity with hospital-clinic group in 130-bed hospital expanding to 200 beds this year, including addition of new PT Dept; 20-man specialty group located in hospital. Dept. under direction of orthopedic surgeon. New graduate acceptable. Salary open. Exceptionally pleasant work atmosphere. Apply Administrator, Holzer Hospital & Clinic, Gallipolis, Ohio.

(continued on next page)

Classified WANT-ADS

RATES

The rate per insertion is $1.00 per line. Typewrite your advertisement carefully and count 50 characters and spaces per line.

ALL WANT-ADS MUST BE PAID FOR IN ADVANCE. Make checks or money orders payable to the American Physical Therapy Association.

Closing date for copy and cancellations is two months preceding publication date.

Institutions or physical therapists who do not wish their identity known may arrange for Blind Ad Code No. All such want-ads must include the following which will be counted as 2 lines:

Address replies to ..... care of **The Physical Therapy Review, 1790 Broadway, New York 19, N. Y.**

IMPORTANT

It is understood and agreed that the publisher shall have the right to reject or change the wording of any advertisement which in the opinion of the Editorial Board shall not be in agreement with the ethical standing of this publication.

Positions Available

PHYSICAL THERAPIST: Staff position. Opportunity for experience in 450-bed general hospital. Salary range $325.00-$350.00 per month. Paid vacation; 6 paid holidays. Blue Cross-Blue Shield group benefits. Immediate opening. Apply Mr. James Dryden, St. Elizabeth Hospital, 49 Hopeland St., Dayton 8, Ohio.

PHYSICAL THERAPIST for growing outpatient clinic in industrial area. Emphasis on rehabilitation of children at present. To begin employment in September 1958; 40-hr. wk., 5 da. vac., S.S. Apply Christine K. Kline, P.T. Executive Director, 209 W. Woodland, Youngstown, Ohio.

ORTHOPEDIC CLINIC with three surgeons needs a qualified physical therapist to work in two-therapist department; salary dependent upon experience. Write: Patricia A. Brooks, Physical Therapist, Knight, Ware and Sutherland Clinic, 2618 Welborn, Dallas, Texas.

PHYSICAL THERAPIST to take charge in small but expanding PT department. Supervision of outstanding physiatrist. Salary open depending on experience. Apply Morristown Rehabilitation Center, 66 Morris St., Morristown, N.J.

GRADUATES OF APPROVED SCHOOLS FOR PHYSICAL THERAPISTS—California has positions open in State Hospitals, the Veterans' Home and special schools for handicapped children. Require registration with California Medical Board. Liberal employee benefits and retirement plan. No experience required to start at $395; raise to $415 after six months; promotional opportunities to $530. Write State Personnel Board, Box 71, 801 Capitol Avenue, Sacramento, California.

STAFF OPENING: at Iowa Methodist Hospital, Des Moines, Iowa. Hospital has 400 beds, including Raymond Blank Memorial Hospital for Children. Construction under way of 120-bed rehabilitation unit. Excellent chance for advancement. In- and outpatient work. Competent professional staff and assistants. Excellent working relationships. Apply Personnel Director.

Registered physical therapist. Woman. INDUSTRIAL hospital of large manufacturing plant. Attractive salary, Company benefits; 5-day week. Write Dr. J. F. McCahan, Medical Director, Western Electric Co., Hawthorne Station, Chicago 23, Illinois.

WANTED: PHYSICAL THERAPIST (female) for full or part-time work in orthopedic surgeon's office. Write to Daniel B. Eck, M.D., 144 South Harrison Street, East Orange, N. J.

INTERESTED IN REHABILITATION? STAFF PHYSICAL THERAPIST: varied case load, modern equipment, excellent medical supervision; 5-day week, liberal vacations, sick leave, salaries. Pleasant staff residence optional. Near ski areas and summer resorts; 70 miles from Boston. Crotched Mountain Children's Center, Greenfield, N. H.

Registered Physical Therapist, NEW GRADUATE, experience not necessary. Position available September 1, 1958. Salary open. Write to: Dr. Dwight Frost, Physical Medicine and Rehabilitation, University of Nebraska College of Medicine, 42nd and Dewey Ave., Omaha, Nebr.

Positions Available:

CHIEF physical therapist to establish physical therapy section of NEW Rehabilitation Center for Children, and to supervise activities and personnel of section. Entire center and operation new.
STAFF physical therapist for work in above section. Salaries open and commensurate with qualifications. Refer replies to: Dwight M. Frost, M. D., Medical Director, 600 Doctors Building, Omaha 5, Nebraska.

PHYSICAL THERAPIST for EXPANDING Department. Beginning salary, $4,000 for inexperienced therapist. Good personnel policies, paid vacation, sick leave, Blue Cross-Blue Shield, annual salary increment, 37½ hour week. Crossroads is in a beautiful new building, well equipped, and nationally recognized as a leader in the field of rehabilitation. It has good medical supervision. Only pleasant, cooperative and dependable need apply. Write or call Roy E. Patton, Executive Director, Crossroads Rehabilitation Center, 3242 Sutherland, Indianapolis, Indiana. Phone—WAlnut 6-2482.

Physical Therapist

For ultra modern hospital located on Chicago's north shore near parks and beaches; excellent starting salary; many liberal employee benefits including free Blue Cross, meals at cost, and a university tuition refund plan. Will consider recent graduate; for more information contact Personnel Director, Weiss Memorial Hospital, 4646 Marine Drive, Chicago 40, Illinois.

Position available in New Hospital with fully equipped PT Department. Supervisor's salary available. Write Tom Callahan, Schumpert Sanitarium, Shreveport, La.

REGISTERED PHYSICAL THERAPIST: (Male) For modern well equipped Physical Therapy Dept. in private office. Patients both industrial and private. Excellent salary, periodic increments, 45-hour, 5½ day work week, paid vacation, Blue Cross and many other liberal benefits. Apply Drs. Houston, Roy, Faust, Ewin & Assoc., 912 Union St., New Orleans 12, La.

Registered staff physical therapist needed for new department. Good pay; 40-hour week. Liberal personnel benefits. Catherine Booth Hospital, 426 Wisconsin Ave., Chicago 14, Ill.

Physical therapist for suburban Philadelphia public health nursing agency to give CONSULTANT SERVICES to staff of 25 nurses and direct services to homebound patients. Beginning salary $4,200 (higher if experience warrants it). Social Security, retirement, 40-hour 5-day week. Liberal personnel policies. Position open now. Apply Executive Director, Community Nursing Service, 60 S. Lansdowne Avenue, Lansdowne, Pa.

Burdick

one unit offering

continuous

or **pulsed**

ultrasound

Now, the all-new UT-400 provides *continuous* ultrasonic energy for conditions where both heating and mechanical effects are desired, or *pulsed* energy where a greater proportion of mechanical effect to thermal is indicated.

Although *continuous* ultrasound therapy is widely used throughout the country, *pulsed* energy is a relatively new development. Its advocates claim greater clinical effectiveness because the mechanical action can be increased with far less accumulation of heat. When the UT-400 is used for pulsed ultrasound, there is a duty factor of 20%.

Attractively housed in an aluminum cabinet measuring 16″ wide x 12″ high x 9″ deep, the UT-400 weighs only 25 pounds complete with standard accessories.

Total output: 21 watts (pulsed), 15 watts (continuous). Automatic timer switch.

BURDICK UT-400 ULTRASONIC UNIT

ASK FOR A DEMONSTRATION OF THE NEW BURDICK UT-400 SOON!

THE BURDICK CORPORATION
MILTON, WISCONSIN
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PHYSICAL THERAPY
& REHABILITATION EQUIPMENT

THERAPEUTIC EXERCISE MAT

Made of 2½" Polyurethene Foam
with water proof, plastic coated, nylon cover
Designed for Physical Therapy

The LaBerne Exercise Mats were designed after much study and research with Physical Medicine Departments. Through this research and cooperation, it was found that 2½" Polyurethene Foam covered with smooth, tough, plastic coated nylon offered a mat, firm yet soft, with complete protection of knees and elbows.

4x7x2½ covered 12 oz. nylon plastic coated, red or yellow, weight 15 lbs.

No. 9100 — Custom size
Price $109.20 — $4.90 sq. ft.

Same as above except 18 oz. nylon plastic coated cover, yellow only.

No. 9192 — Custom size
Price $137.20 — $5.90 sq. ft.

above—FINGER BOARD

Wooden base, serving as an arm rest, has pegs which are used for abduction, or lateral stretching of fingers. Useful for re-education of muscles which control finger movements, and for loosening stiff joints. Stairway of eight ¾" steps, mounted on base 25" x 5½". Finished in natural.

No. 405 — Price $12.50

left—SHOULDER LADDER

A single, vertical unit with 36 steps at 1¼" intervals. Offers progressive mobility of the arm at shoulder, elbow and wrist joint. Polished and lacquered in natural smooth finish. Ladder is 90" long. Holes drilled in each end for easy installation.

No. 505 — Price $15.00

All Prices F.O.B. Columbia

MAT PLATFORM

Facilitates mat exercises for both therapist and patient. Standard size 48"x84"x18" high. Constructed of light weight reinforced steel frame. Top ¾" ply hardwood finished in natural wood. Platform designed to support over one thousand pounds.

No. 9296 48x84x18 inches — Price $79.50
Also available in any size and height.

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La Berne MANUFACTURING COMPANY

Columbia, S.C. P.O. Box 5245 Phone SUnset 7-6162

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